



IOWA STATEWIDE ITS ARCHITECTURE

DRAFT

Prepared for:



Prepared by:



October 2005

Table of Contents

1.	Introduction.....	1
1.1	Vision, Mission, and Objectives	1
1.2	Description of the Region	2
1.3	Organization of the Report.....	4
2.	ITS Architecture Development Process.....	6
2.1	Architecture Development Process.....	6
2.2	Architecture Development Coordination	6
2.3	Requirements of the Final FHWA Rule and FTA Policy on Architecture	8
3.	Stakeholders and Operational Concept.....	10
3.1	Identification of Participating Agencies and Stakeholders	10
3.2	Operational Concept	14
4.	Inventory.....	28
5.	User Services and Market Packages	52
5.1	Identification of User Services.....	52
5.2	Mapping User Services to Market Packages	52
5.3	Customization of Market Packages	56
6.	Subsystems, Equipment Packages and Functional Requirements.....	68
6.1	Mapping of Market Packages to Subsystems and Equipment Packages	68
6.2	Functional Requirements	74
7.	Interconnects and Architecture Flows.....	77
7.1	System Interconnects	77
7.2	Architecture Flows.....	78
7.3	High-Level Architectures for Selected Projects	81
8.	ITS Standards	87
8.1	Standards Benefits	87
8.2	Recommended Standards for Iowa	88
8.3	Mapping of Recommended Standards to Application Areas.....	92
9.	Project Sequencing.....	100
10.	Agreements	111
11.	Implementation and Integration Strategy	116
11.1	Using ITS Architecture in Planning and Project Definition	116
11.2	Integration Strategy.....	119
12.	Architecture Maintenance Plan.....	121
12.1	Introduction.....	121
12.2	Who Is Responsible for Architecture Maintenance	122

12.3	What Will Be Maintained	122
12.4	Configuration Control.....	123

Appendices

Appendix A:	Stakeholder Survey Questionnaire.....	A-1
Appendix B:	Functional Requirements.....	B-1
Appendix C:	Architecture Interconnect Diagrams	C-1
Appendix D:	Architecture Flows	D-1

List of Figures

Figure 1-1.	Iowa Statewide ITS Architecture Boundaries.....	3
Figure 2-1.	Architecture Development Process	7
Figure 4-1.	Iowa DOT Dynamic Message Sign Locations.....	47
Figure 4-2.	Iowa DOT Weigh Scale Locations	48
Figure 4-3.	Iowa DOT Automatic Traffic Recorder Locations	49
Figure 4-4.	Transit Systems in Iowa	50
Figure 4-5.	Iowa State Patrol Communications Center Locations	51
Figure 7-1.	Iowa statewide ITS Architecture Sausage Diagram.....	78
Figure 7-2.	Sample Interconnect Diagram: Iowa DOT Central Office	79
Figure 7-3.	Sample Architecture Flow Diagram: Iowa DOT CARS.....	80
Figure 7-4.	Project Architecture: Iowa DOT CCTV on RWIS Towers	81
Figure 7-5.	Project Architecture: Iowa DOT Dynamic Speed Zone Signs.....	82
Figure 7-6.	Project Architecture: Iowa DOT Precipitation and Visibility Sensors	82
Figure 7-7.	Project Architecture: Iowa DOT Speed Sensors	84
Figure 7-8.	Project Architecture: Maintenance Drive By Data Download System.....	84
Figure 7-9.	Regional Transit Authority AVL/GPS.....	85
Figure 7-10.	Regional Transit Authority On-board Vehicle Security Cameras	85
Figure 7-11.	Project Architecture: Iowa DOT DMS Project	86

List of Tables

Table 2-1.	Mapping of Requirements to Architecture Outputs	9
Table 3-1.	Iowa Statewide ITS Architecture Stakeholders.....	11
Table 3-2.	Operational Concept for Iowa Statewide Architecture	15
Table 4-1.	Iowa Statewide ITS Inventory.....	29
Table 5-1.	List of User Services for Iowa.....	53
Table 5-2.	User Services Mapping to Market Packages	54
Table 5-3.	List of Market Packages for Iowa Statewide ITS Architecture.....	55
Table 5-4.	List of Market Packages by Architecture Elements	57
Table 6-1.	Market Packages, Subsystems and Equipment Packages.....	69

Table 6-2. Functional Requirements: Iowa DOT TripGuide Network Surveillance.....	76
Table 8-1. Key Standards Supporting the ITS Projects in Iowa.....	89
Table 8-2. Key ITS Standards Application Area Matrix for Iowa	93
Table 9-1. Planned ITS Projects for Iowa Statewide ITS Architecture.....	101
Table 9-2. Planned ITS Projects at Local and Regional Levels	109
Table 10-1. Types of Agreements.....	112
Table 10-2. Iowa Statewide ITS Architecture Existing/Potential Agreements	113
Table 11-1. Systems Engineering Requirements Supported by ITS Architecture.....	119

1. INTRODUCTION

An Intelligent Transportation Systems (ITS) architecture describes the “big picture” for ITS deployment in terms of individual components (i.e. subsystems) that will perform the functions necessary to deliver the desired needs. It describes what is to be deployed but not how those systems are to be deployed. An ITS architecture will define the components and subsystems that must interface with each other, the functions to be performed by those subsystems and the data flows among these subsystems.

The Iowa Statewide ITS Architecture is a roadmap for transportation systems deployment and integration in the state of Iowa. The architecture has been developed through a cooperative effort by the transportation and emergency management agencies, covering all modes and all roads in the state. The architecture represents a shared vision of how each agency’s systems will work together in the future, sharing information and resources to provide a safer, more efficient, and more effective transportation system for travelers in Iowa.

The process for developing the Iowa Statewide ITS Architecture is based on the National ITS Architecture developed by the United States Department of Transportation (USDOT). Compliance with the National Architecture is mandatory, as part of the Final Rule published by the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) on January 8, 2001 for receiving Federal funds for ITS projects. By taking advantage of the USDOT’s National ITS Architecture and developing a regional ITS architecture that is consistent with the National ITS Architecture, the state of Iowa will be able to take advantage of the growing supplier/vendor market for ITS products and services. As the standards are implemented across the nation, economies of scale will be realized in the purchase and development of ITS related products and services.

1.1 Vision, Mission, and Objectives

Vision

Stakeholders in Iowa have recognized the need for vision and strategic planning with respect to ITS technology. The vision for the Iowa Statewide ITS Architecture is one of enhanced transportation productivity, mobility, safety efficiency and security through the use of integrated, cost-effective ITS technologies and systems and strong operational relationships.

Mission

The mission for the Iowa Statewide ITS Architecture is to develop an open and integrated ITS architecture that is compliant with the FHWA Final Rule and FTA Policy on ITS Architecture and Standards to support existing and future ITS projects and enhance compatibility of existing architectures within Iowa and emerging national ITS architecture

Objectives

Eight objectives were established as a means towards realization of the mission statement above. They are:

- Establish an ITS architecture that: is open, receptive and adaptable; is consistent with developing national standards; provides opportunities for private/public partnerships; and encourages and supports interagency cooperation;
- Develop and integrate traveler information, traffic management, public transportation management, maintenance and construction management, and emergency management systems throughout Iowa as appropriate.
- Define how information is collected, processed, distributed and disseminated.
- Define interfaces and information flow among/between subsystems, agencies, and users.
- Support transportation planning process and provide key input to the State Transportation Plan and Statewide Transportation Improvement Plan, as well as the Long Range Transportation Plans and Transportation Improvement Plans for the Metropolitan Planning Organizations (MPOs);
- Support development of strategies and actions in planning process that lead to an integrated, efficient intermodal transportation system;
- Support development of ITS projects;
- Assist in developing, prioritizing, and addressing consistency of proposed transportation investment;

1.2 Description of the Region

The region covered by this architecture is the entire state of Iowa. As shown in Figure 1-1, the state is covered by six Iowa Department of Transportation (DOT) districts. A total of 8 District Transportation Planners have been assigned to provide planning coordination for areas of the state and generally coincide with the boundaries of Regional Planning Affiliations (RPAs).

18 RPAs were established in Iowa in 1992. The RPA regions have been formed in Iowa to provide grassroots comments in the development of the State Transportation Plan and the Statewide Transportation Improvement Plan (STIP). All RPAs are set up along county lines, as established by the local governments in an area. Each RPA has established a Transportation Policy Committee and a Transportation Technical Committee to address planning and programming issues in the regional area. Each RPA is responsible for developing a regional transportation plan and regional transportation improvement program, which are incorporated into the state transportation plan and the STIP. The 18 RPAs are:

1. Upper Explorerland Regional Planning Commission
2. North Iowa Area Council of Governments
3. Northwest Iowa Planning and Development Commission
4. Siouxland Interstate Metropolitan Planning Council
5. MDAS Council of Governments
6. Region Six Planning Commission
7. Iowa Northland Regional Transportation Authority
8. East Central Intergovernmental Association
9. Bi-State Regional Commission
10. East Central Iowa Council of Governments
11. Central Iowa Regional Transportation Planning Alliance
12. Region XII Council of Governments

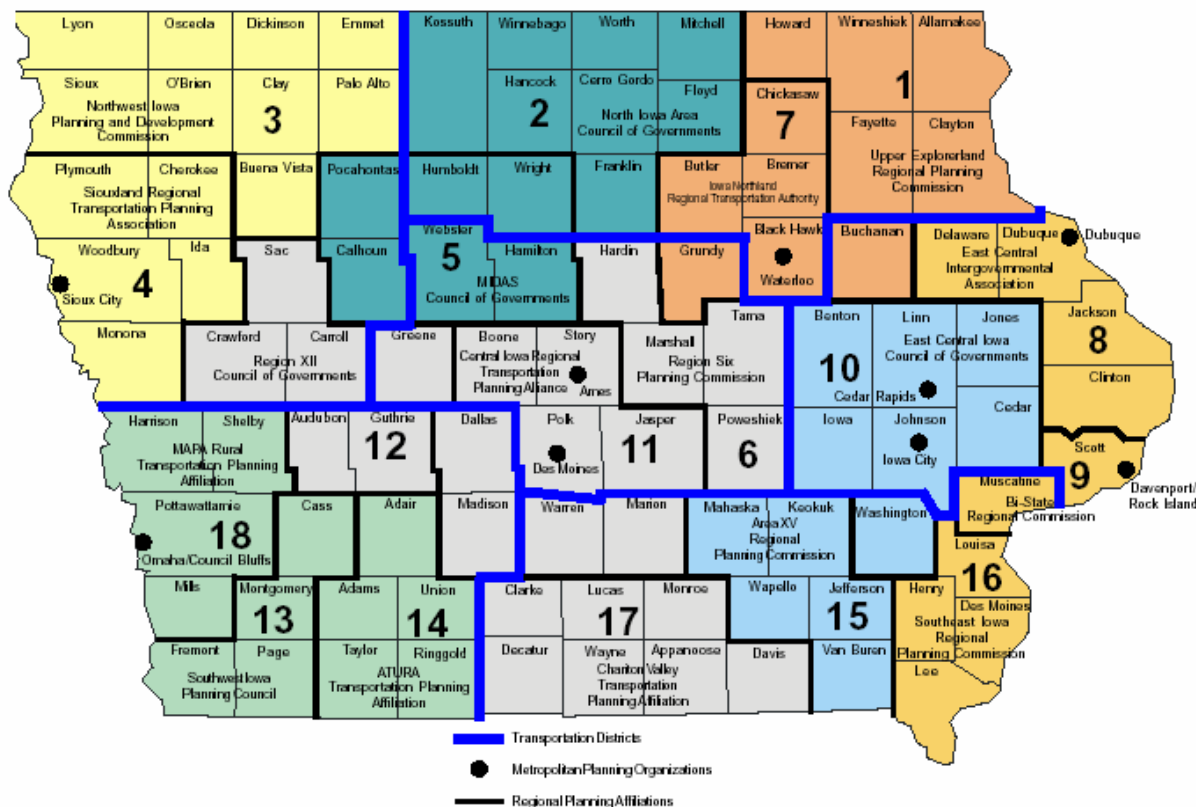


Figure 1-1. Iowa Statewide ITS Architecture Boundaries

- 13. Southwest Iowa Planning Commission
- 14. ATURA Transportation Planning Affiliation
- 15. Area Fifteen RPA
- 16. Southeast Iowa Regional Planning Commission
- 17. Chariton Valley Transportation Planning Commission
- 18. MAPA Rural Transportation Planning Affiliation

In addition, the state of Iowa has 9 MPOs. MPOs are planning organizations, designated by federal law and established by governors and local governments, to consider issues in urbanized areas with populations of 50,000 or more. Each of the 9 MPOs has also established a Transportation Policy Committee and a Transportation Technical Committee to address transportation planning and programming issues in the metropolitan area. The MPOs are responsible for developing metropolitan transportation plans and transportation improvement programs within their boundaries. Those plans and programs are incorporated into the State Transportation Plan and the STIP. The 9 MPOs are:

- Cedar Rapids-Marion Urbanized Area - Linn County Regional Planning Commission
- Davenport - Bi-State Regional Commission
- Des Moines - Des Moines Area Metropolitan Planning Organization
- Dubuque - Dubuque Metropolitan Area Transportation Study

- Iowa City-Coralville Urbanized Area - Johnson County Council of Governments
- Council Bluffs - Metropolitan Area Planning Agency
- Sioux City - Siouxland Interstate Metropolitan Planning Council
- Waterloo - Iowa Northland Regional Council of Governments
- Ames - Ames Area Metropolitan Planning Organization

1.3 Organization of the Report

This report is organized based on the general process for the development of the Statewide ITS Architecture for the state of Iowa. The major sections of the report are summarized as the following:

- **Section 1 - Introduction:** This section identifies the vision, mission, and objectives of the Iowa Statewide ITS Architecture. It also provides a general description of the area covered in the statewide ITS architecture.
- **Section 2 - ITS Architecture Development Process:** This section describes process for developing the Iowa Statewide ITS Architecture and summarizes the requirements of the final FHWA Rule and FTA policy on ITS Architecture and Standards.
- **Section 3 – Stakeholders and Operational Concept:** This section identifies and describes participating agencies and stakeholders and their roles and responsibilities in the operation and implementation of the ITS systems and/or components within the state.
- **Section 4 – Inventory:** This section identifies the existing and planned ITS elements within the state.
- **Section 5 – User Services and Market Packages:** This section identifies a list of user services and market packages that are applicable to the state. The user services describe what transportation functions and services should be provided from the user's perspective. The market packages provide a collection of service-oriented technology bundles that can be incorporated in the development of the statewide ITS architecture.
- **Section 6 – Subsystems, Equipment Packages and Functional Requirements:** The customized list of market packages developed in Section 5 was used to define the subsystems, equipment packages, and functional requirements that are necessary for the implementation of the customized market packages.
- **Section 7 – Interconnects and Architecture Flows:** This section describes the physical architecture by defining interfaces between equipment and systems that may be deployed by different organizational or operating agencies throughout the state.
- **Section 8 – ITS Standards:** This section describes a list of key standards that support the implementation of the statewide ITS architecture.

- **Section 9 – Project Sequencing:** This section provides an implementation strategy as well as the sequencing of ITS project required for implementation in the next 10 years.
- **Section 10 – Agreements:** This section identifies and summarizes a list of agreements between agencies that are required for operations.
- **Section 11 – Implementation and Integration Strategy:** This section describes the relationship between the statewide ITS architecture and transportation planning process. It summarizes how the statewide ITS architecture can be used to assist in transportation planning and project implementation. This section also describes the opportunities and considerations for integrating ITS projects and systems at the regional and statewide levels.
- **Section 12 – Architecture Maintenance Plan:** This section describes a process for controlled updates to the statewide ITS architecture baseline so that the architecture continues to accurately reflect the existing ITS capabilities and future plans in the state.

2. ITS ARCHITECTURE DEVELOPMENT PROCESS

2.1 Architecture Development Process

The process used to develop the Iowa Statewide ITS Architecture is illustrated in Figure 2-1. Figure 2-1 shows six general steps in the “lifecycle” of an ITS architecture. In the first four steps, the ITS architecture products are developed and then these products are used and maintained in steps 5 and 6. The development process begins with basic scope definition and team building and moves through increasingly detailed steps, culminating in specific products that will guide the “implementation” of the statewide ITS architecture.

Development of the Iowa Statewide ITS Architecture begins with the identification of stakeholders and their needs. The success of a statewide ITS architecture depends on participation by a diverse set of stakeholders. The objective of identifying stakeholders is to identify and engage stakeholders that own or operate ITS systems and other agencies that have an interest in the transportation issues within the State of Iowa.

Information on existing and planned ITS projects within the State was collected through a comprehensive stakeholder survey. The survey results were then compiled and used as an “entrance” into the National ITS Architecture and mapped against the Market Packages and the physical architecture defined in the National ITS Architecture. A market package is a “bundle” of technology services that is often purchased together as a group to provide the functions necessary to deploy the services. The selection of market packages allows for the identification of equipment packages and subsystems – a collection of building blocks for the development of an ITS architecture. The physical architecture defines the Physical Entities (Subsystems and Terminators) that make up an intelligent transportation system. It defines the Architecture Flows that connect the various Subsystems and Terminators into an integrated system.

An ITS architecture coordinates overall system operation by defining interfaces between equipment and systems (interconnect and architecture flows). These interfaces describe the functions of the systems by showing the information that flows between various systems and subsystems.

Upon identification of the system interfaces, additional products were defined to guide the implementation of planned ITS projects. These products include a sequence of projects, list of agency agreements required for operations, and a list of ITS standards that shall be considered for project implementation.

2.2 Architecture Development Coordination

Coordination with other ITS architecture efforts within the state has been a crucial step in the statewide ITS architecture development effort. Inventory on existing, on-going, and planned ITS architecture efforts within the state has been gathered during the statewide ITS architecture development process. The architecture efforts in the state include the regional ITS architectures for the nine MPOs and the Statewide Transit System ITS Architecture.

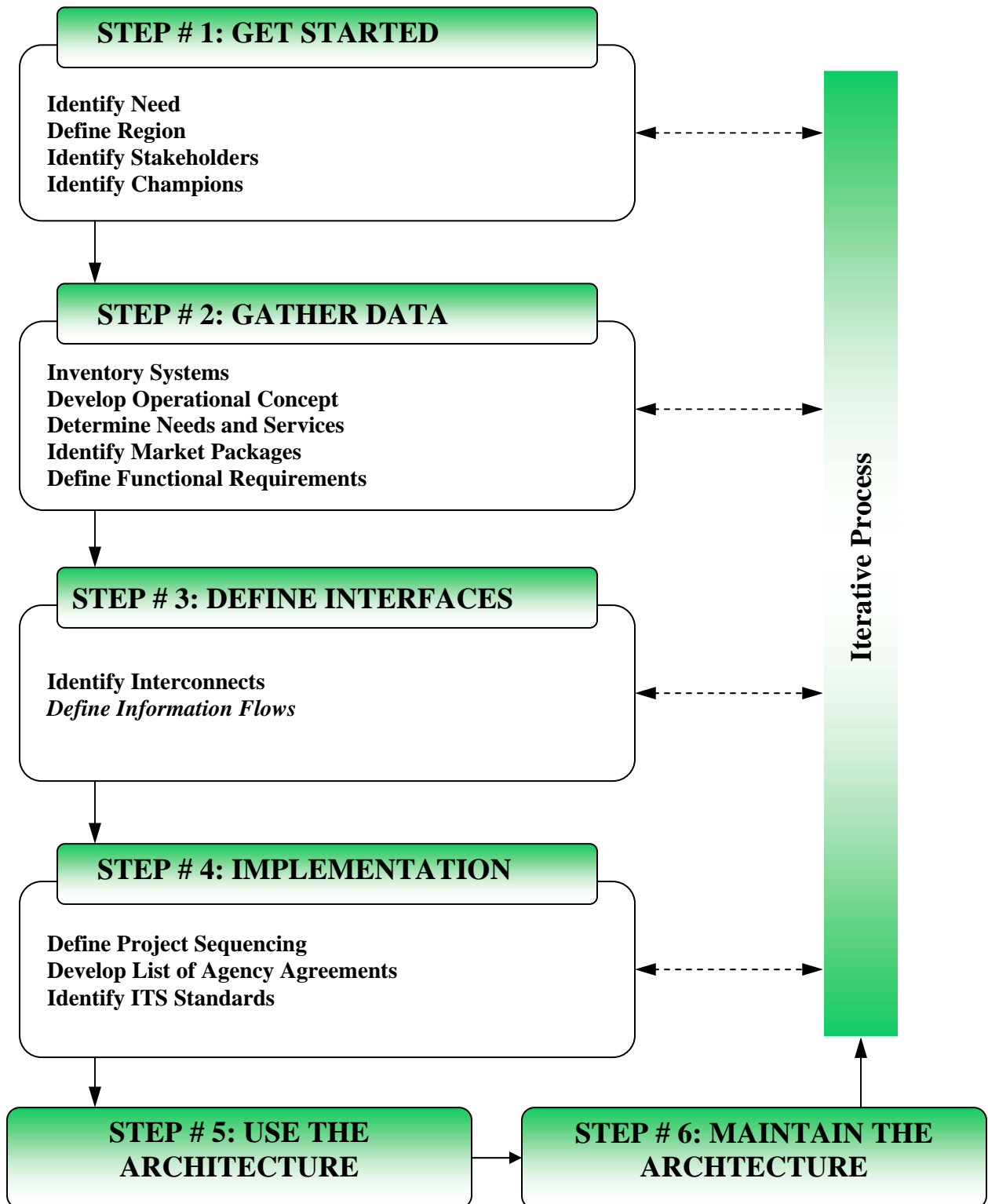


Figure 2-1. Architecture Development Process

It should be noted that the Iowa Statewide ITS Architecture should not be considered as the singular architecture for all information flow and communications among the various stakeholders involved. ITS projects within the state that are outside of the Iowa Statewide ITS Architecture exist, and they may be included in other regional ITS architectures developed by the MPOs. As such, federal ITS funding eligibility for those projects should be retained.

Through constant information sharing and cross-referencing, coordination between the Iowa Statewide ITS Architecture and other architecture efforts within the state has been promoted to enhance architecture consistency throughout the entire state of Iowa. As part of the coordination effort, the following resources were used as references in the architecture development process:

- Iowa DOT Integrated ITS and Services Deployment Plan (2001)
- Iowa DOT Statewide System Architecture (2000)
- Iowa DOT ITS Plans (FY 2005 and FY 2006)
- Iowa DOT Dynamic Message Sign Statewide Deployment Plan (2005)
- Iowa State Transportation Plan (1997)
- Iowa Statewide Transportation Improvement Programs (2006-2008)
- Iowa Statewide Transit ITS Deployment Plan for Rural and Small Urban Transit Systems (2002)
- Iowa Transit System Plan (1999)
- Abstract: Deployment of State-wide Transit ITS through the Iowa Rural Transit ITS Consortium (2005)
- Radio Survey Summaries and Recommendations for Regional Transit Agencies (2005)
- I-74 Bridge Incident Management and Response System Documentation (2004)
- MPO/RPA Regional ITS Architectures (Des Moines, Ames, Omaha/Council Bluffs, Sioux City, Waterloo, Cedar Rapids, Iowa City, Dubuque/ECIA, and Bi-State Regional Commission)
- Neighboring State Statewide ITS Architectures (Illinois, Wisconsin, South Dakota, and Minnesota)
- Des Moines Metropolitan Area ITS Strategic Plan (1997)
- MPOs' and RPAs' Long Range Transportation Plans and Transportation Improvement Programs
- City's Capital Improvement Programs and Budget Documents
- Iowa State Patrol Operational Report – 2004

2.3 Requirements of the Final FHWA Rule and FTA Policy on Architecture

The FHWA Final Rule (23CFR 940) and FTA Policy on ITS Architecture and Standards, which took effect on April 8, 2001, defines a set of requirements that regional ITS architectures should meet. The FHWA Final Rule and FTA Final Policy state that – “ITS projects shall conform to the National ITS Architecture and Standards in accordance with the requirements. Conformance with the National ITS Architecture is interpreted to mean the use of the National ITS Architecture to develop a regional ITS architecture, and the subsequent adherence of all ITS projects to that regional ITS architecture. Development of the regional ITS architecture should be consistent with the transportation planning process for Statewide and Metropolitan

Transportation Planning.” Table 2-1 shows how the requirements of the rule are met by the outputs developed for the Iowa Statewide ITS Architecture.

Table 2-1. Mapping of Requirements to Architecture Outputs

Statewide/Regional ITS Architecture Requirements	Where Requirements documented
Description of region	Geographic definition, as well as timeframe and scope of services are given in Section 1 of this document.
Identification of participating agencies and other stakeholders	Listing of stakeholders and their definitions is given in Section 3.1 of this document. An inventory of the elements operated by the stakeholders is contained in Section 4 of this document.
An operational concept that identifies the roles and responsibilities of participating agencies and stakeholders	The operational concept is defined in Section 3.2 of this document.
A list of any agreements (existing or new) required for operations	A discussion of existing and needed new agreements is given in Section 10 of this document.
System functional requirements	The functional requirements of the ITS systems are described in an overview in Section 7 of this document, and are provided in detail in the Turbo Architecture database.
Interface requirements and information exchanges with planned and existing systems and subsystems	The Interfaces and information flows are described in an overview in Section 6 of the document, and are described in detail in the Turbo Architecture database.
Identification of ITS standards supporting regional and national interoperability	An overview of the ITS standards is given in Section 8 of the document. The detailed listing of ITS standards applicable to each interface in the architecture is described in the Turbo Architecture database.
The sequence of projects required for implementation	Projects and their sequencing are covered in Section 9 of this document.

3. STAKEHOLDERS AND OPERATIONAL CONCEPT

3.1 Identification of Participating Agencies and Stakeholders

Stakeholders are commonly considered to be those who own or operate ITS systems in the region as well as those who have an interest in regional transportation issues. As stakeholders provide crucial input regarding the region's transportation investment and ITS deployments, stakeholder participation and coordination is critical to the success of the ITS architecture development. The Iowa Statewide ITS Architecture includes a wide range of stakeholders. Table 3-1 lists the agencies and stakeholders participated in the implementation and operation of the ITS projects in Iowa.

The participating agencies and stakeholders of the Iowa Statewide ITS Architecture were identified from the following two major sources/channels:

- Regional stakeholders were identified through the regional ITS architectures developed for the nine Metropolitan Planning Organizations (MPOs) in Iowa. The nine MPOs include Des Moines, Omaha/Council Bluffs, Sioux City, Bi-State, Ames, Dubuque, Cedar Rapids/Marion, Waterloo/Cedar Falls and Iowa City/Coralville. Each MPO identified its perspective ITS stakeholders through an extensive outreach process, including stakeholder meetings, workshops, surveys, and interviews.
- In collaboration with the Iowa DOT as well as through stakeholder surveys and interviews, additional stakeholders that were not covered by the MPOs' regional ITS architectures were also identified and included in the statewide ITS architecture.

Table 3-1 includes both specific individual stakeholders and broadly defined generic stakeholders. Most of the specific stakeholders are at multi-state level and state level. Generic stakeholders, representing a group of stakeholders that provide similar roles, responsibilities and functions, are typically at regional and county/city levels. The main purpose of defining and using generic stakeholder groups at regional and county/city level is to allow a more efficient way to organize the statewide ITS architecture and to keep the architecture at a maintainable level.

Table 3-1. Iowa Statewide ITS Architecture Stakeholders

Stakeholder Name	Stakeholder Description
Multi-State Stakeholders	
Federal Motor Carrier Safety Administration (FMCSA)	The primary mission of FMCSA is to reduce crashes, injuries and fatalities involving large trucks and buses.
Federal Highway Administration (FHWA)	FHWA is a Federal agency with the broad responsibility of ensuring that America's roads and highways continue to be the safest and most technologically up-to-date. FHWA provides financial and technical support to State, local, and tribal governments for constructing, improving, and preserving America's highway system.
Federal Transit Administration (FTA)	FTA administers public transportation including buses, subways, light rail, commuter rail, monorail, passenger ferries, trolleys, inclined railways, and people movers. FTA provides financial assistance to state and local transit providers for developing new transit systems and improving, maintaining, and operating existing systems.
Federal Aviation Administration (FAA)	FAA is primarily responsible for the advancement, safety and regulation of civil aviation, as well as overseeing the development of the air traffic.
International Registration Plan (IRP), Inc.	The IRP, Inc. administers International Registration Plan. For motor carriers operating under the International Registration Plan, registering a fleet of inter-jurisdictional vehicles becomes a one-stop process for motor carriers, with a simple, one-step registration.
International Fuel Tax Association (IFTA), Inc.	The IFTA, Inc. administers the International Fuel Tax Agreement.
National Weather Service	National Weather Service provides weather forecast and issues warnings related to adverse weather conditions.
State Level Agencies	
Iowa Department of Transportation	State Department of Transportation of Iowa which plans, constructs, maintains and improves the state's road and bridges, and provides planning and financial support for other modes of transportation.
Iowa Department of Transportation Motor Vehicle Division	A state agency administers and enforces federal and state motor vehicle laws and regulations, and provides driver services, motor carrier services and vehicle services.
Iowa Department of Transportation Maintenance Office	A state agency administers and provides statewide direction for all maintenance activities completed by contract and DOT forces, and plans and administers maintenance of highways and bridges, including snow and ice control.
Iowa Department of Transportation Transit Office	A state agency coordinates all public transportation through the designated public transit agencies and works as a liaison with the FTA in managing funds to transit agencies in Iowa.
Iowa Department of Transportation Aviation Office	A state agency administers several funding programs for airport improvement projects and works as a liaison with the FAA.

Stakeholder Name	Stakeholder Description
Iowa Department of Transportation Transportation Data Office	A state agency responsible for gathering, maintaining, analyzing, and distributing transportation related information, including roadway, structure, and rail-crossing data, traffic statistics, and intelligent map products that support the economic, environmental, and social vitality of Iowa.
Iowa Department of Transportation Traffic and Safety Office	A state agency responsible for managing the operation of the transportation system to ensure safe travel, and reviewing traffic safety situations/issues and maintaining safety management system.
Iowa Department of Transportation Research and Technology Bureau	A state agency responsible for facilitating research needs identification, research program development and implementation, and related funding.
Iowa Department of Transportation Systems Planning Office	A state agency preparing comprehensive, intermodal and modal transportation system plans for the state.
Iowa Dept of Nature Resources	The government agency responsible for maintaining state parks and forests, protecting the environment, and managing energy, fish, wildlife, and land and water resources in Iowa.
Iowa Homeland Security and Emergency Management (HLSEM) Division	Iowa HLSEM, a division of Iowa Department of Public Defense, to support, coordinate, and maintain state and local homeland security and emergency management activities to establish sustainable communities and assure economic opportunities for Iowa and its citizens.
Iowa National Guard	A division of Department of Public Defense, provides units and equipment to protect life and property, to preserve peace and order, and to ensure public safety of the citizens of Iowa
Iowa State Patrol	Routinely patrols state roadways, including interstates, state highways and secondary county roads, enforces motor vehicle laws, and assists in major incidents.
Iowa Communications Network	A state agency that administers a statewide fiber optics network.
Neighboring States	A stakeholder group representing agencies and stakeholders of adjacent states that coordinate with Iowa agencies on transportation management within state border regions.
Regional Level Stakeholders	
Iowa Department of Transportation District Offices	A stakeholder group representing Iowa DOT regional offices including traffic offices, construction offices, maintenance garages and material offices, which support transportation network management within the jurisdiction areas.
Iowa State Patrol District Offices	A stakeholder group representing Iowa State Patrol regional offices which are responsible for state roadways patrols, law enforcement, and incidents response within the jurisdiction areas.
Regional Transit Authorities (RTA)	A stakeholder group representing RTA regions 1-16 which provide demand responsive and fixed-route services to the general public, elderly, disabled, school students, HeadStart Program, and others within the jurisdiction areas. The stakeholder group also includes private transit and taxi service providers that are contracted with RTA to provide transit services.

Stakeholder Name	Stakeholder Description
Metropolitan Planning Organizations	Provide transportation planning and technical assistance services to various agencies within the MPO jurisdiction areas.
County/City Level Stakeholders	
Counties and Cities	A stakeholder group representing all the counties, cities, municipalities, and universities that have ITS components.
County and City Sheriff, Police, Fire and EMS 911 Dispatch Centers	A stakeholder group representing 911 dispatch centers that receive 911 emergency calls and dispatch sheriff, police, fire and EMS within the jurisdiction areas. Dispatch centers may belong to city police departments, county sheriff's offices, or university police.
County and City Emergency Medical Services	A stakeholder group representing county and city Emergency Medical Services.
County Engineer Offices	A stakeholder group representing county engineer offices responsible for county roadway and bridge maintenance and construction (including snow and/or ice control), and traffic control and management within the jurisdiction areas. Involved agencies may use other different office names, such as County Secondary Roads, County Engineering, etc.
County Emergency Management Agencies	A stakeholder group representing county emergency management agencies responsible for coordinating, maintaining and administering emergency management and homeland security practices within county jurisdiction areas.
County Sheriff's Offices	A stakeholder group representing county sheriff's offices responsible for public safety within the jurisdiction areas.
City Public Works Departments	A stakeholder group representing city and municipal public works departments responsible for city traffic control and management and streets and bridges maintenance (including snow and/or ice control) within the jurisdiction areas. Involved agencies may use other different department names, such as City Engineering, City Maintenance and Construction, etc.
City Police Departments	A stakeholder group representing city and municipal police and university police departments responsible for public safety within the jurisdiction areas.
City Fire Departments	A stakeholder group representing city and municipal fire departments responsible for fire prevention and fire rescue within the jurisdiction areas.
Large Urban Transit Agencies	A stakeholder group of transit agencies providing transit services to large urban areas. Agencies include Des Moines Metropolitan Transit Authority, City of Ames CyRide, City of Bettendorf Transit, University of Iowa CamBus, City of Cedar Rapids Five Seasons Transportation & Parking, City of Coralville Transit, City of Council Bluffs Special Transit Service, City of Davenport CitiBus, City of Dubuque Keyline Transit, Iowa City Transit, Sioux City Transit and Metropolitan Transit Authority of Black Hawk County.

Stakeholder Name	Stakeholder Description
Small Urban Transit Agencies	A stakeholder group of transit agencies providing services to small urban areas. Agencies include Burlington Urban Service, City of Clinton Municipal Transit Administration, City of Fort Dodge DART, Marshalltown Municipal Transit, Mason City Public Transit, City of Muscatine MuscaBus, and City of Ottumwa Transit.
Des Moines International Airport	Airport serving the Des Moines and Central Iowa region.
City of Council Bluffs Mid America Center	A Heartland's premier entertainment and convention center in City of Council Bluffs.
Other Stakeholders	
Railroad Companies	A stakeholder group representing owner/operators of rail transportation facilities and associated ITS equipment and communications.
Private Yellow Page Service Providers	A stakeholder group representing privately owned yellow page service providers that provide lodging, food and other information to travelers via kiosks, internet or other media.
Private Trucking Companies	A stakeholder group representing trucking companies that operate commercial vehicles.
Private Weather Service Providers	A stakeholder group representing private environmental and transportation weather information service providers.
Private Towing Companies	A stakeholder group representing private towing companies.
Media Outlets	TV and radio stations, news media, etc.

3.2 Operational Concept

An operational concept defines each stakeholder's current and future roles and responsibilities in the implementation and operation of the ITS systems in Iowa. Table 3-2 summarizes the general roles and responsibilities of the participating stakeholders identified above. As illustrated, the roles and responsibilities are categorized in eleven transportation service areas. These transportation service areas provide general classifications of what functions the participating agencies are providing or will provide. The eleven service areas and their major functions are described in the following.

Archived Data Management – Archived data management represents the functions that collect, process, store and utilize transportation data including traffic data, accident data, maintenance and construction data, public transportation data, commercial vehicle data, emission data, parking data and others.

Commercial Vehicle Operations – Commercial vehicle operations represents the administrative functions that support commercial vehicle credentials, tax, and safety regulations.

Electronic Payment – Electronic payment represents the functions that support electronic payment of transportation services, including transit, parking and tolls.

Emergency Management – Emergency management represents the functions that provide emergency call taking, public safety dispatch, disaster response and evacuation, securing monitoring and other security and public safety-oriented services.

Incident Management – Incident management represents the functions that manage both unexpected incidents and planned events so that the impact to the transportation network and traveler safety is minimized. It includes incident detection and verification, appropriate incident response, and regional coordination between traffic management agencies, maintenance and construction management agencies, emergency management agencies and others.

Maintenance and Construction Management – Maintenance and construction management represents the functions that provide construction management and maintenance of roadways, including snow and ice removal.

Parking Management – Parking Management represents the functions that provide enhanced monitoring and management of parking facilities and coordination between parking facilities.

Public Transportation – Public transportation represents the functions that plan, manage, operate and maintain transit services. It also includes the function that provides transit traveler information.

Traffic Management – Traffic management represents the functions that manage a broad range of transportation facilities including freeway systems, rural and suburban highway systems, and urban and suburban traffic control systems.

Traveler Information – Traveler information represents the functions that collect, process, store, and disseminate static and real time transportation information to the traveling public.

Transportation Planning and Architecture Maintenance – Transportation planning and ITS architecture maintenance represents transportation planning functions and other related services. It also includes roles and responsibilities for the development and maintenance of an ITS architecture within the stakeholder’s jurisdiction boundary.

Table 3-2. Operational Concept for Iowa Statewide Architecture

Stakeholder	Transportation Service	Role/Responsibility	Status
Iowa Department of Transportation	Archived Data Management	Maintain databases for Condition Acquisition and Reporting System (CARS), Road Weather Information System (RWIS), Decision Support Environment System/Coordinated Transportation Analysis and Management System (CTAMS), etc.	Existing
	Emergency Management	Support disaster response and recovery, and disaster evacuation.	Existing
		Provide disaster-related information to the public.	Existing

Stakeholder	Transportation Service	Role/Responsibility	Status
		Operate permanent Dynamic Message Sign (DMS) for AMBER Alerts.	Existing
		Operate security cameras at rest areas.	Planned
	Traffic Management	Communicate traffic related information to other agencies.	Existing
		Operate DMS at rest areas and welcome centers across Iowa to disseminate information including AMBER Alerts, Time/Temperature and road construction/condition.	Planned
	Traveler Information	Provide telephone traveler information (511 System) via either cell phone or landline.	Existing
		Provide traffic conditions, road weather, incidents, road restrictions, roadway work, alerts, and other transportation-related information via Internet. The website includes www.511ia.org , www.weatherview.dot.state.ia.us , and www.i235.com . The websites would be enhanced to include new features and information.	Existing
		Provide wireless access point at rest areas.	Existing
		Manage CARS to collect traveler information including road construction, traffic, road weather, accidents, and special events from the authorized agencies including Iowa State Patrol and Iowa DOT Maintenance and Construction, and develop and enhance CARS main system and subsets like CARS-511, CARS-DMS, CARS-AMBER, CARS-Long Power FM (LPFM), etc.	Existing/ Planned
		Operate kiosks at rest areas displaying limited information about highway and weather conditions, local hotels, restaurants and tourist attractions.	Planned
	Transportation Planning and ITS Architecture Management	Coordinate the Iowa Statewide ITS Architecture development and implementation with stakeholders.	Existing
		Responsible for the maintenance of the Iowa Statewide ITS Architecture.	Existing
Iowa Department of Transportation District Offices	Archived Data Management	Maintain district databases including traffic and maintenance and construction data.	Existing
	Emergency Management	Participate in coordinated emergency response with local emergency agencies.	Existing
		Provide resources to support emergency management when requested by emergency agencies.	Existing
		Support disaster response and recovery, and disaster evacuation.	Existing
		Provide disaster-related information to the public.	Existing
		Operate permanent DMS for AMBER Alerts.	Existing

Stakeholder	Transportation Service	Role/Responsibility	Status
	Incident Management	Perform incident verification through video surveillance.	Existing
		Provide incident information to local incident response agencies including emergency management, public safety, and/or transportation.	Existing
		Coordinate incident response, road closures and detours with local incident response agencies.	Existing
		Provide resources to support incident management when requested by local incident response agencies	Existing
		Provide highway helper services to assist stranded motorists.	Existing
		Operate roadside equipment including portable and permanent DMS for incident management.	Existing/ Planned
		Operate I-74 Bridge and I-80 Incident Management Warning Systems.	Planned
	Maintenance and Construction Management	Provide construction management and perform maintenance of interstate, state highways and bridges.	Existing
		Dispatch maintenance vehicles for planned activities (road maintenance, snow plowing, etc.) and unplanned incidents within the jurisdiction area.	Existing
		Communicate maintenance and construction schedule and other related information with local agencies.	Existing
		Provide maintenance on agency vehicle fleet.	Existing
		Maintain DOT roadside equipment.	Existing
		Operate RWIS system and collect road weather information along major roadways, and distribute road weather information to local public safety agencies and transportation agencies.	Existing
		Operate automated bridge Anti-Icing system to improve roadway safety.	Existing
		Operate field devices including sensors, cameras, and/or DMS for maintenance and construction activities.	Existing/ Planned
		Operate AVL/GPS systems to track maintenance vehicles locations and collect relative data for analysis.	Existing/ Planned
		Operate overheight detection and warning Systems.	Existing/ Planned
	Traffic Management	Manage and control roadside equipment (including CCTV, DMS, HAR, detection sensors, LPFM, and others)	Existing/ Planned
		Communicate traffic related information to other agencies.	Existing

Stakeholder	Transportation Service	Role/Responsibility	Status
		Operate I-235 TripGuide to control ITS field devices (i.e., HAR, CCTV, DMS, and detection sensors).	Existing
		Operate dynamic speed zone signs displaying speeds of vehicles approaching speed zones.	Planned
		Operate automatic gate closure systems.	Planned
Iowa Department of Transportation Motor Vehicle Division	Archived Data Management	Maintain state's crash report data (including data from TraCS system) and commercial vehicle credential and safety data.	Existing
	Commercial Vehicle Operations	Administer and enforce federal and state motor vehicle laws and regulations.	Existing
		Administer credential and safety information of carriers, drivers and vehicles.	Existing
		Provide electronic permit applications and reporting, electronic commercial vehicle inspection system, and commercial vehicle operation and management information via Internet.	Existing
		Operate Weigh-in-Motion scales, PrePass, radiation detection, and other roadside inspection equipment throughout the state for law and regulations enforcement.	Existing
		Manage FMCSA Performance and Registration Information System Management (PRISM) program for Iowa which system can identify and prioritize motor carriers for on-site inspections.	Existing
		Provide commercial vehicle inspection and crash records to the FMCSA Motor Carrier Management Information System (MCMIS).	Existing
		Coordinate commercial vehicle inspection with Iowa State Patrol and local law enforcement agencies.	Existing
		Manage IFTA credential information for carriers which base jurisdiction for IFTA reporting and licensing is Iowa.	Existing
		Manage IRP registration information in Iowa.	Existing
		Use TraCS system to speed safety inspection data processing and communication with other state, county and city agencies.	Existing
Iowa Department of Transportation Maintenance Office	Maintenance and Construction Management	Perform maintenance of interstate, state highways and bridges.	Existing
		Communicate and coordinate maintenance and construction schedule and other related information with local agencies.	Existing

Stakeholder	Transportation Service	Role/Responsibility	Status
		Operate RWIS system and collect road weather information along major roadways, and distribute road weather information to local public safety agencies and transportation agencies.	Existing
		Operate field devices including sensors, cameras, and/or DMS for maintenance and construction activities.	Existing/ Planned
		Utilize Winter Road Maintenance Decision Support System to determine best winter road treatments.	Planned
Iowa Department of Transportation Transit Office	Public Transportation	Coordinate ITS projects, funding support and other related management activities with local public transit agencies.	Existing
Iowa Department of Transportation Aviation Office	Archived Data Management	Maintain weather condition data collected from Automated Weather Observing Stations (AWOS) installed at airports.	Existing
	Maintenance and Construction Management	Manage Iowa Aviation Weather System (IAWS) to collect real-time weather conditions at airports and disseminate weather information.	Existing
	Public Transportation	Administrate funding programs for airport improvement projects.	Existing
Iowa Department of Transportation Transportation Data Office	Archived Data Management	Maintain state transportation data, roadway data/map, etc.	Existing
Iowa Department of Transportation Traffic and Safety Office	Archived Data Management	Provide crash data analysis tools/data, including Microsoft Access-based Accident Location and Analysis System (Access-ALAS) and GIS-based Safety Analysis, Visualization, and Exploration Resource (GIS-SAVER), and related crash analysis service.	Existing
	Maintenance and Construction Management	Oversee safety issues on work zone activities and participate in ITS projects that improve work zone safety such as the Midwest States Smart Work Zone Deployment Initiative project.	Existing
	Traffic Management	Manage the preservation and operation of the transportation system to ensure safe travel.	Existing
		Improve transportation through technology.	Existing
		Maintain Iowa Safety Management System.	Existing
		Manage Traffic Safety Improvement Program.	Existing
	Transportation Planning and Architecture Maintenance	Provide transportation planning services for state DOT.	Existing
		Coordinate planning activities with the MPOs and RPAs.	Existing

Stakeholder	Transportation Service	Role/Responsibility	Status
Iowa Department of Transportation Research and Technology Bureau	Transportation Planning and Architecture Maintenance	Manage DOT ITS projects and related research activities, and coordinate them with other DOT divisions/offices and local agencies.	Existing
Federal Motor Carrier Safety Administration	Archived Data Management	Maintain central databases for commercial vehicle management, including MCMIS, and Safer/PRISM database, and provide related reports to the public.	Existing
	Commercial Vehicle Operations	Manage PRISM program and coordinate motor carrier information with participated states.	Existing
		Manage MCMIS and coordinate motor carriers crash and inspection information with state agencies.	Existing
		Communicate and coordinate other motor carrier information/activities with state agencies.	Existing
International Fuel Tax Association, Inc.	Commercial Vehicle Operations	Allocate fuel taxes between multiple states for motor carrier activities across jurisdictional boundaries, in accordance with the International Fuel Tax Agreement.	Existing
		Coordinate IFTA carrier information and transmittal records between participating states.	Existing
International Registration Plan, Inc.	Commercial Vehicle Operations	Support the IRP base state agreement electronically. Streamline the exchange and reconciliation of registration information and fees by (1) enabling jurisdiction to electronically exchange motor carriers and fee information between jurisdictions; (2) providing an electronic remittance netting function with concurrent electronic fund Transfer capability through a central IRP bank; (3) tracking all amounts due to/from a base jurisdiction; (4) provide reports on the information exchanged and netted fees processed.	Existing
National Weather Service	Emergency Management	Provide weather alerts to local emergency responding agencies.	Existing
	Maintenance and Construction Management	Provide weather information to local agencies.	Existing
Iowa State Patrol and Districts	Commercial Vehicle Operations	Participate in roadside vehicle inspection for law and regulations enforcement.	Existing
		Exchange safety and/or security information with other agencies.	Existing
	Emergency Management	Operate six communication centers to provide emergency call taking (911) and dispatch state patrol vehicles on the jurisdiction roadways.	Existing
		Coordinate emergency response with local emergency agencies.	Existing

Stakeholder	Transportation Service	Role/Responsibility	Status
		Support disaster response and recovery, and disaster evacuation.	Existing
		Provide disaster-related information to the public	Existing
		Responsible for issuing AMBER Alerts.	Existing
		Operate security monitoring systems to monitor public travel-related areas for potential threats and detect potential and actual disasters.	Existing
	Incident Management	Routinely patrol major roadways including interstates, US highways, state highways and secondary county roads, and enforce motor vehicle laws.	Existing
		Receive emergency calls for incidents within the jurisdiction area and dispatch state patrol vehicles responding to emergency calls.	Existing
		Coordinate incident response with local incident response agencies including emergency management, public safety, and/or transportation, including road closure.	Existing
		Use TraCS system for accident reporting.	Existing
		Operate permanent DMS for incident management.	Planned
	Traveler Information	Observe/collect winter road conditions on Interstates, US highways, and major state highways. The road condition information is input into CARS.	Existing
Iowa Homeland Security and Emergency Management Division	Emergency Management	Develop state wide emergency preparedness plans.	Existing
		Provide emergency management center for statewide emergency operations and homeland security practices during major emergencies and disasters,	Existing
		Coordinate with local, state, and federal agencies.	Existing
Iowa Department of Nature Resources	Traffic Management	Organize and plan air monitoring activities within the State of Iowa, and contract with local agencies to collect air monitoring data, quality assure the results, and report the data to the public.	Existing
Iowa Communications Network	Traffic Management	Participate into DOT ITS projects for fiber optics network.	Existing
Iowa National Guard	Emergency Management	Support disaster response and recovery, and disaster evacuation.	Existing
Metropolitan Planning Organizations	Archived Data Management	Collect and archive transportation data including traffic counts, accident information, etc.	Planned
	Transportation Planning and ITS Architecture Maintenance	Provide transportation planning and technical assistance services to various agencies within the region, including ITS projects.	Existing
		Coordinate the stakeholders of the Regional ITS Architectures on the architecture implementation.	Existing

Stakeholder	Transportation Service	Role/Responsibility	Status
		Responsible for the maintenance of the Regional ITS Architectures.	Existing
Regional Transit Authorities	Archived Data Management	Collect and archive transit data.	Existing/Planned
	Incident Management	Report incident information to local incident response agencies.	Existing
	Emergency Management	Support disaster response and recovery, and disaster evacuation.	Existing
	Traveler Information	Provide general transit information such as transit routes and schedules, transit transfer options, and transit fares to travelers.	Existing
	Electronic Payment	Operate electronic fare payment systems.	Planned
	Public Transportation	Dispatch fixed route and demand responsive services to the jurisdiction area.	Existing
		Operate software to support schedule, dispatch operations, and other transit management activities.	Existing/Planned
		Operate AVL/GPS system to track vehicle locations.	Existing/Planned
		Operate security camera systems to monitor transit vehicles, transit yards, or transit stops.	Existing/Planned
		Provide maintenance on agency vehicle fleet.	Existing
Provide transit signal priority functions at signalized intersections.		Planned	
	Provide real-time transit traveler information.	Planned	
Large Urban Transit Agencies	Archived Data Management	Collect and archive transit data.	Existing/Planned
	Electronic Payment	Operate automatic passenger loading and electronic fare payment system.	Existing/Planned
	Emergency Management	Support disaster response and recovery, and disaster evacuation.	Existing
	Incident Management	Report incident information to local incident response agencies.	Existing
	Traveler Information	Provide general transit information such as transit routes and schedules, transit transfer options, and transit fares to travelers.	Existing
	Public Transportation	Dispatch fixed-route and demand responsive services to the jurisdiction area.	Existing
		Operate software to support schedule, dispatch operations, and other transit management activities.	Existing
		Operate security camera systems to monitor transit vehicles, transit yards, or transit stops.	Existing/Planned
		Provide maintenance on agency vehicle fleet.	Existing
		Operate AVL/GPS system to track vehicle locations.	Existing/Planned

Stakeholder	Transportation Service	Role/Responsibility	Status
		Provide real-time transit information via website, kiosks, on-board display/audio, bus stop electronic display/audio, etc.	Existing/ Planned
		Provide transit signal priority functions at signalized intersections.	Planned
Small Urban Transit Agencies	Archived Data Management	Collect and archive transit data.	Planned
	Electronic Payment	Operate electronic fare payment system.	Planned
	Emergency Management	Support disaster response and recovery, and disaster evacuation.	Existing
	Incident Management	Report incident information to local incident response agencies.	Existing
	Traveler Information	Provide general transit information such as transit routes and schedules, transit transfer options, and transit fares to travelers.	Existing
	Public Transportation	Dispatch fixed-route and demand responsive services to the jurisdiction area.	Existing
		Operate software to support schedule, dispatch operations, and other transit management activities.	Existing/ Planned
		Operate security camera systems to monitor transit vehicles, transit yards, or transit stops.	Existing/ Planned
		Provide maintenance on agency vehicle fleet.	Existing
		Provide real-time transit information via website, kiosks, on-board display/audio, bus stop electronic display/audio, etc.	Existing/ Planned
		Operate AVL/GPS system to track vehicle locations.	Planned
		Provide transit signal priority functions at signalized intersections.	Planned
County Emergency Management Agencies	Emergency Management	Develop countywide emergency management plan addressing preparation, response, recovery and mitigation actions for all potential risks to the public.	Existing
		Provide emergency management center for countywide emergency operations and homeland security practices during major emergencies and disasters.	Existing
	Incident Management	Coordinate incident response with local incident response agencies.	Existing
County Sheriff's Offices	Commercial Vehicle Operations	Participate in roadside vehicle inspection for law and regulation enforcement.	Existing
		Exchange safety and/or security information with other agencies.	Existing
	Emergency	Respond to emergency dispatches.	Existing

Stakeholder	Transportation Service	Role/Responsibility	Status
	Management	Coordinate emergency response with local emergency agencies.	Existing
		Support disaster response and recovery, and disaster evacuation.	Existing
		Provide disaster-related information to the public.	Existing
	Incident Management	Respond to incident dispatches.	Existing
		Coordinates incident response with local incident response agencies including emergency management, public safety, and/or transportation.	Existing
		Use TraCS system for accident reporting.	Existing
County Engineer Offices	Emergency Management	Coordinate emergency responses with local emergency agencies.	Existing
		Provide resources to support emergency management when requested by emergency agencies.	Existing
		Support disaster response and recovery, and disaster evacuation.	Existing
	Incident Management	Perform incident verification through video surveillance.	Planned
		Provide incident information to local incident response agencies including emergency management, public safety, and/or transportation.	Existing
		Provide resources to support incident management when requested by local incident response agencies.	Existing
		Coordinate incident response, road closures and detours with local incident response agencies.	Existing
	Maintenance and Construction Management	Provide construction management of county roads.	Existing
		Dispatch maintenance vehicles for planned activities (road maintenance, snow plowing, etc.) and unplanned incidents within the jurisdiction area.	Existing
		Provide maintenance on agency vehicle fleet.	Existing
		Communicate maintenance and construction schedule and other related information to local agencies.	Existing
		Operate RWIS system for maintenance purposes.	Existing
		Operate AVL system to track maintenance vehicle/equipment locations.	Planned
	Traffic Management	Operate roadside equipment (that may include traffic signal system, DMS, detection sensors, CCTV, or others) within the county jurisdictions.	Existing
		Communicate traffic related information to other agencies	Existing
City Police Departments	Commercial Vehicle Operations	Participate in roadside vehicle inspection for law and regulation enforcement.	Existing/ Planned

Stakeholder	Transportation Service	Role/Responsibility	Status
	Emergency Management	Exchange safety and/or security information with other agencies.	Existing/Planned
		Respond to emergency dispatches.	Existing
		Coordinate emergency response with local emergency agencies.	Existing
		Support disaster response and recovery, and disaster evacuation.	Existing
		Provide disaster-related information to the public.	Existing
	Incident Management	Respond to incident dispatches.	Existing
		Coordinates incident response with local incident response agencies including emergency management, public safety, and/or transportation.	Existing
		Use TraCS system for accident reporting.	Existing
		Operate red lighting running systems.	Existing/Planned
City Fire Departments	Emergency Management	Respond to emergency dispatches.	Existing
		Coordinate emergency response with local emergency agencies.	Existing
	Incident Management	Respond to incident dispatches.	Existing
		Coordinates incident response with local incident response agencies including emergency management, public safety, and/or transportation.	Existing
City Public Works Departments	Archived Data Management	Collect and archive transportation data including traffic and maintenance.	Existing
	Emergency Management	Coordinate emergency response with local emergency agencies.	Existing
		Provide resources to support emergency management when requested by emergency agencies.	Existing
		Support disaster response and recovery, and disaster evacuation.	Existing
	Incident Management	Perform incident verification for city streets.	Existing
		Provide incident information to local incident response agencies including emergency management, public safety, and/or transportation.	Existing
		Provide resources to support incident management when requested by local incident response agencies.	Existing
		Coordinate incident response, road closures and detours with local incident response agencies.	Existing
		Operate roadside equipment including portable DMS for incident management.	Existing
	Maintenance and Construction	Manage maintenance and construction activities of city roads.	Existing

Stakeholder	Transportation Service	Role/Responsibility	Status
	Management	Dispatch maintenance vehicles for planned activities (road maintenance, snow plowing, etc.) and unplanned incidents within the jurisdictions.	Existing
		Provide maintenance on agency vehicle fleet.	Existing
		Communicate maintenance and construction schedule and other related information to local agencies.	Existing
		Maintain city roadside equipment.	Existing
		Operate field devices including sensors, cameras, and/or DMS for maintenance and construction activities.	Existing/ Planned
		Operate AVL/GPS systems to track maintenance vehicle locations	Existing/ Planned
		Operate RWIS system for maintenance purposes.	Existing/ Planned
		Operate automated roadway Anti-Icing system to improve roadway safety.	Planned
	Traffic Management	Operate traffic signal systems within city jurisdictions	Existing
		Operate DMS, CCTV, detection sensors, and other roadside equipment within city jurisdictions.	Existing
		Communicate traffic related information to other agencies	Existing
		Operate rail crossing control equipment at highway rail intersections, including RR Crossing Automated Horn Warning System.	Existing
		Operate Railroad Crossing/DMS Information System.	Planned
County and City Sheriff, Police, Fire and EMS 911 Dispatch Centers	Emergency Management	Provide emergency call taking (911) within the county and/or city jurisdiction area and dispatch Sheriff, Police, Fire and EMS services.	Existing
		Coordinate emergency response with local emergency agencies.	Existing
		Support disaster response and recovery, and disaster evacuation.	Existing
		Provide disaster-related information to the public.	Existing
	Incident Management	Provide emergency call taking for incidents within the county and/or city jurisdiction area and dispatch Sheriff, Police, Fire and EMS services to incidents.	Existing
		Coordinate incident response with local incident response agencies including emergency management, public safety, and/or transportation.	Existing
		Operate roadside equipment including DMS for incident management.	Existing/ Planned
County and City	Emergency	Dispatch ambulances to respond to emergencies.	Existing

Stakeholder	Transportation Service	Role/Responsibility	Status
Emergency Medical Services	Management	Coordinate emergency response with local emergency agencies.	Existing
		Support disaster evacuation.	Existing
	Incident Management	Dispatch ambulances to respond to incidents.	Existing
		Coordinates incident response with local incident response agencies including emergency management, public safety, and/or transportation.	Existing
Counties and Cities	Traveler Information	Maintain websites to disseminate work zone, road closures and restrictions, detours, parking, traffic, and air quality information to the public.	Existing
		Operate local government cable channels to provide local street construction information, transit information, winter weather advisories and/or other traveler information to cable TV subscribers.	Existing
	Traffic Management	Monitor air quality.	Existing
	Parking Management	Operate Downtown Des Moines parking management system that allows traffic staff to dial-in and monitor occupancy.	Existing
		Operate dynamic signs to display real time information directing drivers to available parking spaces at Downtown Des Moines area.	Planned
Des Moines International Airport	Emergency Management	Coordinate emergency response with local emergency agencies.	Existing
	Incident Management	Coordinate incident response with local incident response agencies.	Existing
City of Council Bluffs Mid America Center	Parking Management	Operate event parking management system with electronic signs to indicate available spaces.	Existing
Private Yellow Page Service Providers	Traveler Information	Provide yellow page information to travelers via kiosks, or other media.	Existing
Railroad Companies	Traffic Management	Operate and maintain rail roadside equipment communicating with traffic signal systems or other traffic control devices at highway rail intersections.	Existing
Media Outlets	Traveler Information	Collect travel-related information from the public sector and private information sources, and broadcast that information to their customers via TV, radio stations, news media, etc.	Existing
Private Trucking Companies	Commercial Vehicle Operations	Manage company vehicle fleets.	Existing
		Coordinate commercial vehicle management activities with DOT.	Existing
Private Weather Service Providers	Maintenance and Construction Management	Provide weather information local agencies such as maintenance and construction.	Existing
Private Towing Companies	Incident Management	Respond to incident dispatches.	Existing

4. INVENTORY

The Iowa Statewide ITS Architecture inventory identifies all ITS systems that are being implemented or planned throughout the state of Iowa. Table 4-1 provides a list of ITS systems, their general descriptions, and associated stakeholders that are involved with or responsible for operations and management of the systems. For a system that has multiple stakeholders involved with, a stakeholder who is the primary owner of the system or plays a leading role in operating the system was identified as the primary stakeholder.

The inventory was gathered from a variety of sources, as noted in Section 2.2 of this report. Resources and references that have been used in the development of this architecture include planning and design documents (State, MPO/RPA, and City), project study reports, regional ITS architectures, and neighboring state statewide ITS architectures. With the assistance from the Iowa DOT, an extensive stakeholder survey was conducted to identify existing and future user needs and ITS inventory in the state of Iowa. The stakeholder survey was distributed to the following stakeholders:

- Iowa DOT Headquarters
- Iowa DOT District Offices
- Iowa DOT Maintenance Office
- Iowa DOT Transportation Data Office
- Iowa DOT Traffic and Safety Office
- Iowa DOT Public Transit Office
- Iowa DOT Rail Transportation Office
- Iowa DOT System Planning Office
- Iowa DOT Motor Vehicle Division
- Iowa DOT Information Technology Division
- Iowa DOT Research and Technology Bureau
- Iowa DOT Rest Areas Management
- Iowa DOT TraCS
- Iowa DOT I-235 Project Office
- Large Urban Transit Agencies
- Small Urban Transit Agencies
- Regional Transit Authorities

Telephone and e-mail follow-ups were also used to collect additional information and to verify information gathered from document review and stakeholder surveys. The stakeholder survey questionnaire is included in Appendix A.

Figures 4-1 to 4-5 illustrate the locations of some ITS elements throughout the state:

- Figure 4-1: Iowa DOT Dynamic Message Sign (DMS) Locations Map
- Figure 4-2: Iowa DOT Weigh Scale Map
- Figure 4-3: Iowa DOT Automatic Traffic Recorder Locations Map
- Figure 4-4: Large Urban, Small Urban, and Regional Transit Systems Map
- Figure 4-5: Iowa State Patrol Communications Center Locations

Table 4-1. Iowa Statewide ITS Inventory

Primary Stakeholder	System	Description	Status	Other Associated Stakeholder
Iowa DOT	511 Traveler Information System	511 traveler information system provides real time traveler information including construction and major delay, road weather, traffic condition, and other transportation-related information via either cell phone or land line.	Existing	
	511 Travel Information Website	511 travel information website (www.511ia.org) provides real time travel information including traffic conditions, incidents, road restrictions, roadway work, alerts, and other transportation-related information. A linkage is connected to the Des Moines TripGuide webpage that shows real-time traffic flow speeds and camera images on I-35, I-80, I-235, US 65, US 69 and Iowa 5 within Des Moines metro area.	Existing	
	I-235 Construction Website	The I-235 website (www.i235.com) provides I-235 travel and construction information. The website has a linkage to the Des Moines TripGuide webpage. Email alerts are also used to provide advance traveler information such as construction plans, detours routes, congestion and incidents to travelers.	Existing	
	WeatherView Website	WeatherView website (http://www.dotweatherview.com) provides real-time road weather information to travelers using the data from RWIS and IAWS. WeatherView is planned to be updated to accommodate new information sources and new forecast formats, such as road cameras information.	Existing	
	TraCS	The National Model for the Statewide Application of Data Collection & Management Technology to Improve Highway Safety is a nationally-recognized program for improving data collection of roadway incidents and sharing safety information. As the foundation of the field data collection, TraCS includes application software combined with mobile laptop computers, imager/bar code scanners, mobile printers, host workstations, and statewide data communications. TraCS provides electronic incident report and other features including electronically capture signatures, image files, and GIS locating capability. The report data are shared via Iowa's statewide public law enforcement communications network, and stored in Iowa DOT state's crash report database resided in Iowa DOT Motor Vehicle Division.	Existing	Iowa DOT Motor Vehicle Division, Iowa State Patrol, Participated County Sheriff and City Police

Primary Stakeholder	System	Description	Status	Other Associated Stakeholder
Iowa DOT	CARS	CARS system collects traveler information including road construction, traffic, road weather, accidents, and special events. The information is input via the internet site by the authorized personnel including Iowa State Patrol and Iowa DOT Maintenance and Construction. Several projects CARS-511, CARS-DMS, CARS+, ON-STAR, CARS-AMBER, CARS-LPFM are undergoing or planned to enhance CARS capabilities.	Existing	
	Decision Support Environment/ CTAMS	Decision support environment system is a GeoData Library that houses a variety of DOT's transportation data including crash records, maintenance data, pavement data, bridge data, etc. Linear Referencing System is used as part of the data integration process. Users can access the GeoData Library data for viewing, reporting, decision support, and in-depth analysis via CTAMS Web, CTAMS Analyst, and other analysis systems. CTAMS Web provides the browser-based access to support decision-making via Internet. CTAMS Analyst offers high-end analysis functions for experienced GIS users.	Existing	
	Iowa DOT District Operations Offices	Manage and control CCTV, DMS, HAR/LPFM, detection sensors, and other roadside equipment within the jurisdiction area for traffic control and management, and communicate traffic related information to other agencies.	Existing	
	Iowa DOT TripGuide	Transportation management center for Des Moines metro area encompassing I-35, I-80, I-235, US 65, US 69 and Iowa 5. The system allows transportation professionals to monitor traffic condition via CCTV and radar sensors, and disseminate traveler information via HAR, permanent and portable DMS, TripGuide Web, etc. The system also supports Highway Helper program and 511 Traveler Information service.	Existing	Iowa Communications Network, City of Des Moines, City of West Des Moines, City of Clive, City of Urbandale
	Iowa DOT Highway Helper Program	Highway Helpers assists motorists on I-235, I-80 and I-35 in the Des Moines metro area. The safety patrols reduce congestion by removing stalled vehicles from the roadway, assisting stranded motorists, and aiding incident management. Helper vehicles will be dispatched by Iowa DOT TripGuide center.	Existing	
	Iowa DOT Traffic Signals	Iowa DOT owns a few traffic signals and these signals are operated and maintained by City of Des Moines or City of Dubuque under joint agreements.	Existing	City Public Works

Primary Stakeholder	System	Description	Status	Other Associated Stakeholder
Iowa DOT	Iowa DOT Vehicle Detection Stations	Collect traffic flow, speed, and/or classification data along state major roadways. Examples include Permanent Continuous Automatic Traffic Recorder stations deployed on major state roadways and municipal streets. It is planned to install speed sensors near or on RWIS sites. Speed information can be used to assess winter maintenance performance, the effects of certain weather events on traffic flow and monitor the current traffic flow for the traveling public.	Existing/ Planned	
	Iowa DOT CCTV	Located at state major interchanges and equipment locations for roadway conditions monitoring, weather conditions monitoring, DMS messages verification, and incident management/emergency management support. Additional cameras are planned on RWIS towers for roadway maintenance and traveler information.	Existing/ Planned	
	Iowa DOT Permanent DMS	Permanent DMS are installed at major Metro/Municipal areas to disseminate traffic accident, AMBER Alerts, special event, and weather condition. New permanent DMS are planned at major municipal areas.	Existing/ Planned	
	Iowa DOT Portable DMS	Used to direct traffic for special events, maintenance and construction, and incident management.	Existing	
	Iowa DOT Highway Advisory Radio (HAR)/LPFM Radio Stations	HAR system, as a dedicated AM radio broadcast, relays traveler information including traffic congestion, construction detours and road conditions to travelers. LPFM radio stations deliver a text to voice message over an assigned FM radio frequency to inform travelers the situation that may impact travel safety.	Existing	
	Iowa DOT Dynamic Speed Zone Signs	Dynamic signs displaying speeds of vehicles approaching speed zones. The system is planned for United Community Schools on Highway 30.	Planned	
	Pedestrian Safety Systems	Use pedestrian detectors such as microware and infrared to sense the presence of pedestrian, and use in-pavement light, illuminate- crosswalk signs, or flasher lights to alert vehicles.	Existing	
	Iowa DOT Overheight Detection and Warning System	Detect vehicle height and alert drivers of overheight vehicles of upcoming height restricted bridges. Such system has been installed in City of Davenport and been planned in City of Sioux City.	Existing/ Planned	

Primary Stakeholder	System	Description	Status	Other Associated Stakeholder
Iowa DOT	I-80 Incident Management Warning System in Iowa City	Using surveillance, detection devices, DMS, kiosks and other communication tools to supply information to the public about the traffic conditions related to area construction and incidents.	Planned	
	I-74 Bridge/Incident Management Warning System in Quad Cities	Using surveillance, detection devices, DMS, kiosks and other communication tools to alert travelers of hazardous occurrences and travel options.	Planned	Illinois DOT
	Foretell	Foretell is an intelligent weather collection, prediction, and distribution service that utilizes information from RWIS and AWOS to provide useful weather information to the public. Iowa DOT does not use this weather forecast system now. Currently weather forecasts are provided to the public through WeatherView website that is based on forecasts received from contracted forecast service providers.	Existing	
	Iowa DOT RWIS	RWIS are deployed along major roadways in the state to monitor road weather conditions, including bridge and pavement surface temperature, air temperature, wind speeds and direction, humidity, etc. The central processing servers are located in Ames and receive RWIS stations data via either radio or telephone. Automated RWIS quality control would be developed. Cell phone and in-vehicle weather information data feeds would be provided. Iowa DOT supervisors would be able to access sensor condition data from the internet with password. It is also planned to update yes/no sensors to optical weather identifiers and visibility detectors or other accurate, versatile precipitation identification equipment. Improved precipitation observations will help maintenance managers and forecasters track the path and characteristics of precipitation. Visibility detection performance will be tested to determine if the observations can be used as a guide for road closures.	Existing/ Planned	
	Smart Work Zone Systems	Use DMS, speed monitoring or other equipment to manage work zone activities.	Planned	

Primary Stakeholder	System	Description	Status	Other Associated Stakeholder
Iowa DOT	Rest Areas WiFi	Rest areas have wireless access point to allow travelers to connect to the internet via personal laptop/notebook or handheld computer/PDA. Travelers can obtain critical highway safety information such as winter road conditions, construction detours and road closings, weather forecasts, AMBER Alerts, and traveler services.	Existing	
	Rest Areas Weather Display System	Weather display system provides travelers with near real-time weather information at rest areas. The system would be replaced by the new kiosk system in the future.	Existing	
	Rest Areas Kiosks	Kiosks at rest areas provide limited information about highway and weather conditions, local hotels, restaurants and tourist attractions. The new kiosk system is taking a live link from the Wi-Fi system to provide an Internet feed to the kiosks.	Planned	Private Yellow Page Providers
	Rest Area DMS	Interior, miniature DMS will be installed at rest areas and welcome centers across Iowa. Information including AMBER Alerts, time/temperature and road construction/condition will be posted on the signs.	Planned	
	Rest Areas Security Cameras	Security cameras installed to monitor rest areas.	Planned	
Iowa DOT Maintenance Office	Iowa DOT Maintenance and Construction Offices/Garages	Dispatch maintenance vehicles for planned activities (road maintenance, snow plowing, etc.) and unplanned incidents within the jurisdiction area, and communicate maintenance and construction schedule and other related information to other agencies.	Existing	
	Iowa DOT Maintenance and Construction Vehicles	A collection of maintenance vehicles that are utilized to support road maintenance, such as Salt/Sand trucks and Road Repair trucks. GPS/AVL technology is being used to track vehicle locations. The information would be available for online viewing. Vehicles may be equipped with other ITS components, such as environmental sensors and vehicle monitoring sensors. Drive By Data Download System is planned to allow the spreader control to gather data from the sander, pre-wet and anti-ice flow meters utilizing GPS/AVL technology, and allow the supervisor to download the data and print out a after storm assessment of how much material was used during the storm.	Existing	

Primary Stakeholder	System	Description	Status	Other Associated Stakeholder
Iowa DOT Maintenance Office	Iowa DOT Maintenance and Construction Field Devices	Maintenance and Construction Field Devices include sensors, cameras and/or DMS for operational purposes of maintenance and construction.	Existing	
	Infrared Frost Detection Camera	The IceHawk® is tested to detect road frost and ice conditions in the winter maintenance environment. The camera is being mounted on a bridge deck rail looking at Interstate 35 North at the 13th street exit on the east side of City of Ames.	Existing	
	Automated Bridge Anti-icing System	The system uses sensors to identify icy conditions, and releases liquid chemicals onto the bridge deck and other areas leading up to the bridge. Such system has been installed in the Cedar Rapids area.	Existing	
	I-35 Light Towers Monitoring Equipment	Instruments on I-35 light towers to record stress points of the towers for warning potential falling of tower light poles.	Existing	
	Winter Road Maintenance Decision Support System	Forecast weather and road conditions and applied computerized criteria to the data to determine best road treatments, including timing of initial and subsequent treatments, type of treatments, and amounts of chemicals.	Planned	
	Advanced Technology Maintenance Vehicles	The advanced technology maintenance vehicles are equipped with selected technologies on pavement surface snow and ice control (plowing and de-icing), fleet utilization (AVL and communication), on-vehicle materials management (combing roadway surface information with onboard inventory system), and equipment management (onboard engine diagnostics).	Planned	
	Laser Road Surface Sensor (LRSS)	LRSS cameras can detect ice, snow, moisture, and slush on surfaces and produce color-enhanced images of two lanes of road. LRSS cameras will be installed on RWIS towers in high traffic or trouble-areas to provide detailed road condition information.	Planned	
	Automated Notification System	Install necessary computer or server equipment to support the automatic cell phone or email notification systems. The system allows a maintenance supervisor to post current weather and pavement conditions. The information can be shared with neighboring supervisors and used for public maintenance activity notification systems.	Planned	

Primary Stakeholder	System	Description	Status	Other Associated Stakeholder
Iowa DOT Maintenance Office	Automatic Gate Closure System	Automatic gates are planned on interstate on-ramps to automatically close the road. The gates would be phoned to activate. The gates would be equipped with flashing lights and be partnered with advance-warning signs that activate when the gates are triggered. Possible technology advancements may include activation through visibility sensor observations. The system is planned on Highway 20 to control access to City of Mason and City of Ames.	Planned	
Iowa DOT Motor Vehicle Division	PrePass System	PrePass is an automatic vehicle identification system that allows participating transponder equipped commercial vehicles to bypass designated weigh stations and port-of-entry facilities across the United States. The PrePass system has been installed at five locations in the state.	Existing	Owner of PrePass
	Weigh-In-Motion (WIM) Equipment	WIM devices at Iowa weigh stations to measure truck weights and axle configuration for enforcing law and regulations	Existing	
Iowa DOT Motor Vehicle Division	Radiation Detection Equipment	Radiation detection equipment for inspecting heavy trucks on radiation and explosives. Equipment includes radiation detectors/monitors permanently mounted on patrol vehicles, mini portable Radical monitors worn by officers as part of their uniform, and MCB2 hand held monitors monitoring radiation levels from a distance that the portables will not pick up.	Existing	
	Motor Vehicle Division Website	Website providing commercial vehicle operation and management information, as well as electronic permit applications and reporting, such as automate oversize/over weight permit applications, title applications, and fuel tax reporting. The website also has an Electronic Commercial Vehicle Inspection System that allows carriers to certify via the Internet that all violations noted on an inspection report have been corrected.	Existing	
Iowa DOT Aviation Office	Iowa Aviation Weather System (IAWS)	The system incorporates a series of Automated Weather Observing Stations (AWOS) to collect real-time weather conditions at airports and a communications network to link the individual stations and disseminate weather information. Automated AWOS quality control would be developed. The AWOS network would be upgraded to send AWOS data directly to the FAA NADIN system. Cell phone and in-vehicle weather information data feeds would be provided. Iowa DOT supervisors would be able to access sensor condition data from the internet with password.	Existing	Federal Aviation Administration, National Weather Service

Primary Stakeholder	System	Description	Status	Other Associated Stakeholder
Iowa DOT Transportation Data Office	Iowa DOT Transportation Database	Collect and archive transportation data including roadway digital maps and traffic volume data.	Existing	
Iowa DOT Traffic and Safety Office	Iowa DOT Crash Analysis Tools	Crash data analysis tools/data include Microsoft Access-based Accident Location and Analysis System (Access-ALAS) and GIS-based Safety Analysis, Visualization, and Exploration Resource (GIS-SAVER).	Existing	
Iowa Homeland Security and Emergency Management Division	Iowa Statewide Emergency Operation Center	Provide emergency management center for statewide emergency operations and homeland security practices during major emergencies and disasters, and coordinate with local, state, and federal agencies.	Existing	
Iowa State Patrol	Iowa State Patrol Communication Centers	Six centers receive 911 calls and calls to the Iowa State Patrol Help Line, and utilize CAD systems to dispatch state patrol emergency vehicles.	Existing	
	Iowa State Patrol	State agency enforcing motor vehicle laws, recognizing and eliminating traffic hazards, and promoting traffic safety. Responsible for issuing AMBER Alerts.	Existing	
	Iowa State Patrol Vehicles	Emergency vehicles responding to dispatch, some equipped with laptop computers and TraCS software to speed up crash investigation process.	Existing	
	Iowa State Patrol Security Monitoring Systems	Utilize security cameras to monitor public travel-related areas for potential threats and disasters.	Existing	
International Fuel Tax Association, Inc.	IFTA Clearinghouse	The IFTA Clearinghouse supports the IFTA base state agreement electronically. The IFTA Clearinghouse coordinates IFTA carrier information and transmittal records between participated jurisdictions.	Existing	
International Registration Plan, Inc.	IRP Clearinghouse	The IRP Clearinghouse supports the IRP base state agreement electronically. The Clearinghouse supports exchange of motor carrier and financial information between participated jurisdictions.	Existing	

Primary Stakeholder	System	Description	Status	Other Associated Stakeholder
Federal Motor Carrier Safety Administration	MCMIS	A central repository of data on motor carriers. It includes operational information filed by carriers on the Motor Carrier Identification Report (MCS-150) and safety violation data reported from Federal and States. The system can provide general or personalized reports including crash reports, census reports, inspection files, and company safety profiles to the public.	Existing	
	PRISM	PRISM places carriers with poor safety performance into a sanctioning process that can ultimately lead to unsafe carriers being placed out-of-service with their commercial vehicle registrations suspended or revoked. The system can identify and prioritize motor carriers for on-site inspections. Central Safer/PRISM database maintains all the data.	Existing	
Regional Transit Authorities	Regional Transit Authorities Transit Dispatch	Dispatch demand-responsive and/or fixed-route services to the jurisdiction area. Software may be used to assist in dispatch, schedule, maintenance, administration, accounting, and/or other transit operation management activities. Regions 1, 3, 5-16 plan to install RouteMatch software to support scheduling, dispatch operations, billing and report.	Existing	
	Regional Transit Authorities Transit Vehicles	A collection of transit vehicles responding to transit dispatches. Vehicles may be equipped with communication system, AVL/GPS, Mobile Data Terminals (MDT), on-board security cameras, in-vehicle display/audio, etc.	Existing	
	Regional Transit Authorities AVL/GPS Systems	Track the exact location of buses to improve transit operations. Region 11 and some contractors of Region 10 currently have installed AVL/GPS systems. Such systems are planned in Regions 1-3, 5, 6, 8-10, and 13-16.	Existing/ Planned	
	Regional Transit Authorities Security Monitoring Systems	(1) On-board vehicle security cameras: vehicle cameras installed on buses to help identify passengers whose behaviors are unacceptable while riding. Regions 9, 10, 13 and 15 currently have security cameras installed on buses. Regions 2, 5, 8, 11, and 13 plan to install (more) security cameras on buses. (2) Security cameras to monitor transit yards and stops. Regions 2 and 9 plan to use security cameras to monitor transit yards. Region 2 also plans to use security cameras to monitor bus stops.	Existing/ Planned	

Primary Stakeholder	System	Description	Status	Other Associated Stakeholder
Regional Transit Authorities	Regional Transit Authorities Transit Signal Priority	Region 11 plans to have the capability to receive priority lights at signalized intersections of Des Moines metro area.	Planned	
	Regional Transit Authorities Electronic Fare Payment Systems	Manage passenger loading and fare payments on-board transit vehicles using electronic means. Such systems are planned in Regions 2, 5, 8, 11 and 12.	Planned	
	Regional Transit Authorities In-Vehicle Display/Audio	Region 9 and 12 plan to install on-board vehicle display/audio equipment to provide real-time transit information to riders.	Planned	
	Regional Transit Authorities Traveler Information Services	Include websites, telephone systems, Kiosks, etc. to provide transit information such as transit routes and schedules, transit transfer options, transit fares, etc.	Existing	
	Regional Transit Authorities Transit Databases	Collect and store transit data. The databases would perform quality checks on the incoming data and error notification, and support general query and report functionality.	Existing/ Planned	
Counties and Cities	County and City Websites	County and city websites to disseminate work zone, road closures and restrictions and detours, parking, and weather information to the public. Linn County, Polk County and University of Iowa websites provide real-time air quality information. City of Des Moines website plans to provide real-time traffic condition, parking, and other traveler information. City of Ames website provides traffic accident information interactively using WebGIS technology and plans to provide real-time traffic information.	Existing	
	City Cable TV Channels	Local government cable channel provides local street construction information, transit information, winter weather advisories and other traveler information to cable TV subscribers. These TV channels may or may not have direct traffic data feeds from transportation agencies. System examples include Des Moines CityChannel DMTV-7 and Dubuque CityChannel 8.	Existing	

Primary Stakeholder	System	Description	Status	Other Associated Stakeholder
Counties and Cities	County and City Air Quality Monitoring Stations	Linn County Public Health, Polk County Public Works, and University of Iowa Hygienic Laboratory are contracted with Iowa Department of Nature Resources to collect air monitoring data, quality assure the results and report the data to the public. Linn County Public Health has monitors located in Linn County, Waterloo and Waverly; Polk County Public Works has monitors located in Polk County; University of Iowa Hygienic Laboratory has monitors throughout Iowa state.	Existing	Iowa Department of Nature Resources
	EM/Traffic Information Sharing Network (COPLINK)	The countywide data sharing project among law enforcement agencies within Polk County that allows all police reports transmitted to a central depository that the technology and software will consolidate the data into a single report complete with relationships created between persons, vehicles, locations, weapons, documents and photos Participated agencies include Polk County Sheriff, Des Moines Police, West Des Moines Police, Urbandale Police, Clive Police, Ankeny Police, Windsor Heights Police, Johnson Police, Iowa Department of Corrections.	Planned	
County Emergency Management Agencies	County Emergency Operation Centers	Provide emergency management center for countywide emergency operations and homeland security practices during major emergencies and disasters.	Existing	
County and City 911 Dispatch Centers	County and City Sheriff, Police, Fire and EMS 911 Dispatch	Receive 911 calls, and dispatch sheriff, police, fire and EMS within the jurisdiction area via communication system. Exchange mutual aid and incident information with other local agencies. CAD dispatch may be equipped.	Existing	County Sheriff, City Police, County and City EMS
	County and City Sheriff, Police, Fire and EMS Vehicles	A collection of emergency vehicles responding to emergency/incident dispatches. Vehicles may be equipped with communication system, signal preemption, TraCS, AVL/GPS, MDT, in-vehicle navigation system, etc.	Existing	County Sheriff, City Police, City Fire, County and City EMS
County Engineer/City Public Works	City of Des Moines Transportation Management Center	TMC located in the Armory of the City of Des Moines. The new signal system will have full expandability to accommodate all of the signalized intersections in the metro area, if needed. Many projects of the City of Des Moines involve the TMC. Some of them include Downtown Signal Coordination, Des Moines Metropolitan Transit Authority Bus Signal Priority, Emergency Signal Preemption, and Downtown Parking Management System.	Existing	

Primary Stakeholder	System	Description	Status	Other Associated Stakeholder
County Engineer/City Public Works	City of Des Moines Parking Management System	Downtown Des Moines parking management system that allows traffic staff to dial-in and monitor occupancy. Installation of dynamic signs to display real time information directing drivers to available parking spaces has been planned.	Existing/ Planned	Iowa DOT
	County and City Traffic Operations Offices	Manage and control CCTV, DMS, detection sensors, and other roadside equipment within the jurisdiction area for traffic control and management, and communicate traffic related information to other agencies.	Existing	
	County and City Traffic Signal Systems	Systems may include loop detectors, video detection, and other signal operation equipment used for the control and management of traffic at intersections. Signal systems may be interconnected and coordinated with each other. Emergency vehicle signal preemption and transit signal priority capabilities may be existing or planned.	Existing	
	County and City Traffic Data Collection Equipment	Roadside equipment to collect traffic flow data. Agencies currently having or planning to have such capabilities include: City of Des Moines, City of Urbandale, City of West Des Moines, City of Bettendorf, City of Sioux City, City of Cedar Rapids, City of Dubuque, City of Council Bluffs, City of Waterloo, City of Cedar Falls, City of Iowa City, City of Ames, City of Maquoketa, and Polk County.	Existing/ Planned	
	County and City CCTV	Roadside equipment to monitors roadway and/or intersections to support traffic management and emergency/incident management. Agencies currently having or planning to have such capabilities include: City of Des Moines, City of Urbandale, City of West Des Moines, City of Bettendorf, City of Davenport, City of Sioux City, City of Council Bluffs, City of Dubuque, City of Waterloo, City of Cedar Falls, City of Cedar Rapids, City of Iowa City, City of Ames City of Maquoketa, and Polk County.	Existing/ Planned	
	County and City Portable DMS	Used to direct traffic for special events, maintenance and construction, and incident management. Agencies currently having or planning to have portable DMS include: City of Des Moines, City of Council Bluffs, City of Davenport, City of Bettendorf, City of Cedar Falls, City of Dubuque, City of Waterloo, City of Iowa City, City of Ames, and Johnson County.	Existing/ Planned	

Primary Stakeholder	System	Description	Status	Other Associated Stakeholder
County Engineer/City Public Works	Railroad Crossing/DMS Information System	Include a detection system to identify an approaching train, and use DMS to alert travelers of the train. The system is planned in City of Sioux City.	Planned	Iowa DOT
	Railroad Crossing Automated Horn Warning Systems	The automated horn system provides a similar audible warning to motorists and pedestrians by using two stationary horns mounted at the crossing. Each horn directs its sound toward the approaching roadway. The horn system is activated using the same track signal circuitry as the gate arms and bells located at the crossing. City of Ames has such systems installed.	Existing	
	County and City Maintenance and Construction Offices	Dispatch maintenance vehicles for planned activities (road maintenance, snow plowing, etc.) and unplanned incidents within the jurisdiction area, and communicate maintenance and construction schedule and other related information to other agencies.	Existing	
	County and City Maintenance and Construction Vehicles	A collection of maintenance vehicles that are utilized to support road maintenance and construction. Vehicles may be or plan to be equipped with ITS components, such as AVL, environmental sensors, and/or vehicle monitoring sensors. Agencies currently having or planning to have such capabilities include Clinton County, Delaware County, Johnson County, City of Cedar Rapids, City of Marion, City of Hiawatha, and City of Ames.	Planned	
	County and City Maintenance and Construction Field Devices	Sensors, cameras and/or DMS for monitoring and controlling maintenance and work zone activities. Agencies currently having such capabilities include City of Council Bluffs, City of Dubuque, and other county and city agencies may plan to have such capabilities.	Existing	
	County and City RWIS	RWIS along major city roadways to monitor roadway weather conditions. Johnson County, City of Davenport, City of Cedar Falls, and City of Cedar Rapids currently have such systems installed. The system is planned in City of Ames.	Existing/ Planned	
	City Flood Level Monitoring Systems	Monitoring flood level. City of Bettendorf and City of Davenport currently have such monitoring stations.	Existing	

Primary Stakeholder	System	Description	Status	Other Associated Stakeholder
County Engineer/City Public Works	City Slippery Conditions Warning System	Detect the roadway conditions and provide a suitable warning to travelers to improve the safety of icing-prone roadways. The system is planned in City of Sioux City.	Planned	Iowa DOT
	City Roadway Anti-Icing System	The system uses sensors to identify icy conditions, and releases liquid chemicals onto the roadway/bridge. City of Ames plans to have such system installed.	Planned	
	County and City Traffic and Maintenance Database	Collect and store traffic data and/or maintenance data. The database can perform quality checks on the incoming data and error notification, and support general query and report functionality.	Existing/ Planned	
City Police	Red Light Running Systems	Using wireless video technology to record the time, date, vehicle speed, and amount of time the light was red when a car speeds through a red light. The data are used to increase public awareness of the problem of red light running. The systems have been installed in City of Bettendorf. City of Council Bluffs, City of Sioux City, City of Davenport, City of Bettendorf, and City of Cedar Rapids plan to have such systems installed.	Existing/ Planned	
Large Urban Transit Agencies	Large Urban Transit Agencies Transit Dispatch	Dispatch fixed-route and/or demand-responsive services to the jurisdiction area. Software may be used to assist in dispatch, schedule, maintenance, administration, accounting, and/or other transit operation management activities.	Existing	
	Large Urban Transit Agencies Transit Vehicles	A collection of transit vehicles responding to transit dispatches. Vehicles may be equipped with communication system, AVL/GPS, MDT, on-board security cameras, in-vehicle display/audio, etc.	Existing	
	Large Urban Transit Agencies AVL/GPS Systems	Track the exact location of buses to improve transit operations. Agencies currently having AVL/GPS systems installed include Des Moines Metropolitan Transit Authority, Sioux City Transit, Cedar Rapids Five Seasons Transportation and Parking, and City of Dubuque Keyline Transit. Agencies including City of Bettendorf Transit, Metropolitan Transit Authority of Black Hawk County, Iowa City Transit, City of Coralville Transit, University of Iowa CamBus, and City of Ames CyRide plan to install AVL/GPS systems.	Existing/ Planned	

Primary Stakeholder	System	Description	Status	Other Associated Stakeholder
Large Urban Transit Agencies	Large Urban Transit Agencies Electronic Fare Payment Systems	Manage passenger loading and fare payments on-board transit vehicles using electronic means. The systems may also include remote traveler supports such as Kiosks for transit fare charging. Agencies including Cedar Rapids Five Seasons Transportation and Parking, Iowa City Transit, City of Coralville Transit, and University of Iowa CamBus currently have such systems installed. Des Moines Metropolitan Transit Authority, City of Dubuque Keyline Transit and Metropolitan Transit Authority of Black Hawk County plan to install such systems. Des Moines Metropolitan Transit Authority plans to evaluate methods to collect ridership counts including automatic sensors.	Existing/ Planned	
	Large Urban Transit Agencies Transit Signal Priority	Des Moines Metropolitan Transit Authority and City of Ames CyRide plan to receive signal priority at signalized intersections.	Planned	
	Large Urban Transit Agencies Security Monitoring Systems	(1) On-board vehicle security cameras: vehicle cameras installed on buses to help identify passengers whose behaviors are unacceptable while riding. Des Moines Metropolitan Transit Authority, Sioux City Transit, Cedar Rapids Five Seasons Transportation and Parking, City of Davenport CitiBus, City of Bettendorf Transit, Iowa City Transit, and City of Ames CyRide currently have such cameras installed on buses. Des Moines Metropolitan Transit Authority, Sioux City Transit, Metropolitan Transit Authority of Black Hawk County, Iowa City Transit, City of Coralville Transit, University of Iowa CamBus, and City of Ames CyRide plan to install (more) cameras on buses. (2) Security cameras to monitor transit yards: City of Dubuque Keyline Transit currently uses cameras to monitor transit yards. Des Moines Metropolitan Transit Authority plans to install cameras to monitor transit facility.	Existing/ Planned	
	Large Urban Transit Agencies In-Vehicle Display/Audio	City of Bettendorf Transit and City of Coralville Transit plan to install on-board vehicle display/audio equipment to provide real-time transit information to riders.	Planned	

Primary Stakeholder	System	Description	Status	Other Associated Stakeholder
Large Urban Transit Agencies	Large Urban Transit Agencies Bus Stop Traveler Information Notification	Sioux City Transit currently use late transfer arrival notification systems at transportation center to inform drivers and riders late bus arrival. City of Ames CyRide plans to install electronic display/audio announcement systems at bus stops to provide real-time transit information to riders.	Existing/ Planned	
	Large Urban Transit Agencies Traveler Information Services	Include websites, telephone systems, Kiosks, etc. to provide transit information such as transit routes and schedules, transit transfer options, transit fares, etc. Des Moines Metropolitan Transit Authority website provides trip planning functions. Sioux City Transit provides real-time bus locations via website and Kiosk. Cedar Rapids Five Seasons Transportation and Parking, City of Bettendorf Transit, City of Dubuque Keyline Transit, University of Iowa CamBus, and City of Ames CyRide plan to provide real-time or tailored transit information to travelers via websites and/or Kiosks.	Existing/ Planned	
	Large Urban Transit Agencies Transit Databases	Collect and store transit data. The database would perform quality checks on the incoming data and error notification, and support general query and report functionality.	Existing/ Planned	
Small Urban Transit Agencies	Small Urban Transit Agencies Transit Dispatch	Dispatch fixed-route and/or demand-responsive services to the jurisdiction area. Software may be used to assist in dispatch, schedule, maintenance, administration, accounting, and/or other transit operation management activities.	Existing	
	Small Urban Transit Agencies Transit Vehicles	A collection of transit vehicles responding to transit dispatches. Vehicles may be equipped with communication system, AVL/GPS, MDT, on-board security cameras, in-vehicle display/audio, etc.	Existing	
	Small Urban Transit Agencies AVL/GPS Systems	City of Clinton Municipal Transit Administration, City of Fort Dodge DART and City of Ottumwa Transit plan to install AVL/GPS systems to track the exact location of buses for improving transit operations.	Planned	

Primary Stakeholder	System	Description	Status	Other Associated Stakeholder
Small Urban Transit Agencies	Small Urban Transit Agencies Security Monitoring Systems	(1) On-board vehicle security cameras: vehicle cameras installed on buses to help identify passengers whose behaviors are unacceptable while riding. City of Ottumwa Transit currently has such cameras installed on buses. City of Clinton Municipal Transit Administration, City of Fort Dodge DART, and Mason City Transit plan to install cameras on buses. (2) City of Clinton Municipal Transit Administration plans to use cameras to monitor transit yards and bus stops.	Existing/ Planned	
	Small Urban Transit Agencies Transit Signal Priority	City of Clinton Municipal Transit Administration plans to receive signal priority at signalized intersections.	Planned	
	Small Urban Transit Agencies Electronic Fare Payment Systems	Manage passenger loading and fare payments on-board transit vehicles using electronic means. City of Clinton Municipal Transit Administration and City of Fort Dodge DART plan to install such systems.	Planned	
	Small Urban Transit Agencies In-Vehicle Display/Audio	Mason City Transit currently has installed on-board vehicle display/audio equipment to provide real-time transit information to riders. Such systems are planned in City of Clinton Municipal Transit Administration.	Existing/ Planned	
	Small Urban Transit Agencies Bus Stop Traveler Information Notification	City of Clinton Municipal Transit Administration plans to install electronic display/audio announcement systems at bus stops to provide real-time transit information to riders.	Planned	
	Small Urban Transit Agencies Traveler Information Services	Include websites, telephone systems, Kiosks, etc. to provide transit information such as transit routes and schedules, transit transfer options, transit fares, etc.	Existing	
	Small Urban Transit Agencies Transit Databases	Collect and store transit data. The databases would perform quality checks on the incoming data and error notification, and support general query and report functionality.	Existing/ Planned	

Primary Stakeholder	System	Description	Status	Other Associated Stakeholder
Des Moines International Airport	Des Moines International Airport Operation	Receive important traveler, weather, and construction information from other agencies, and coordinate with emergency management.	Existing	
City of Council Bluffs Mid America Center	Mid America Center Event Parking Management System	Parking management system with electronic signs to indicate available spaces.	Existing	
Railroad Companies	Rail Operation System	Rail roadside equipment communicating with traffic signal systems or other traffic control devices at highway rail intersections.	Existing	
Private Information Service Providers	Media Outlets	Information systems providing traffic reports, travel conditions, traffic and travel advisory, incident and special event, and other transportation-related news services to the traveling public through radio, TV, and other media.	Existing	
Private Trucking Companies	Commercial Vehicles	Commercial vehicle equipped with the sensory, processing, storage, and communications functions necessary to support safe and efficient commercial vehicle operations.	Existing	

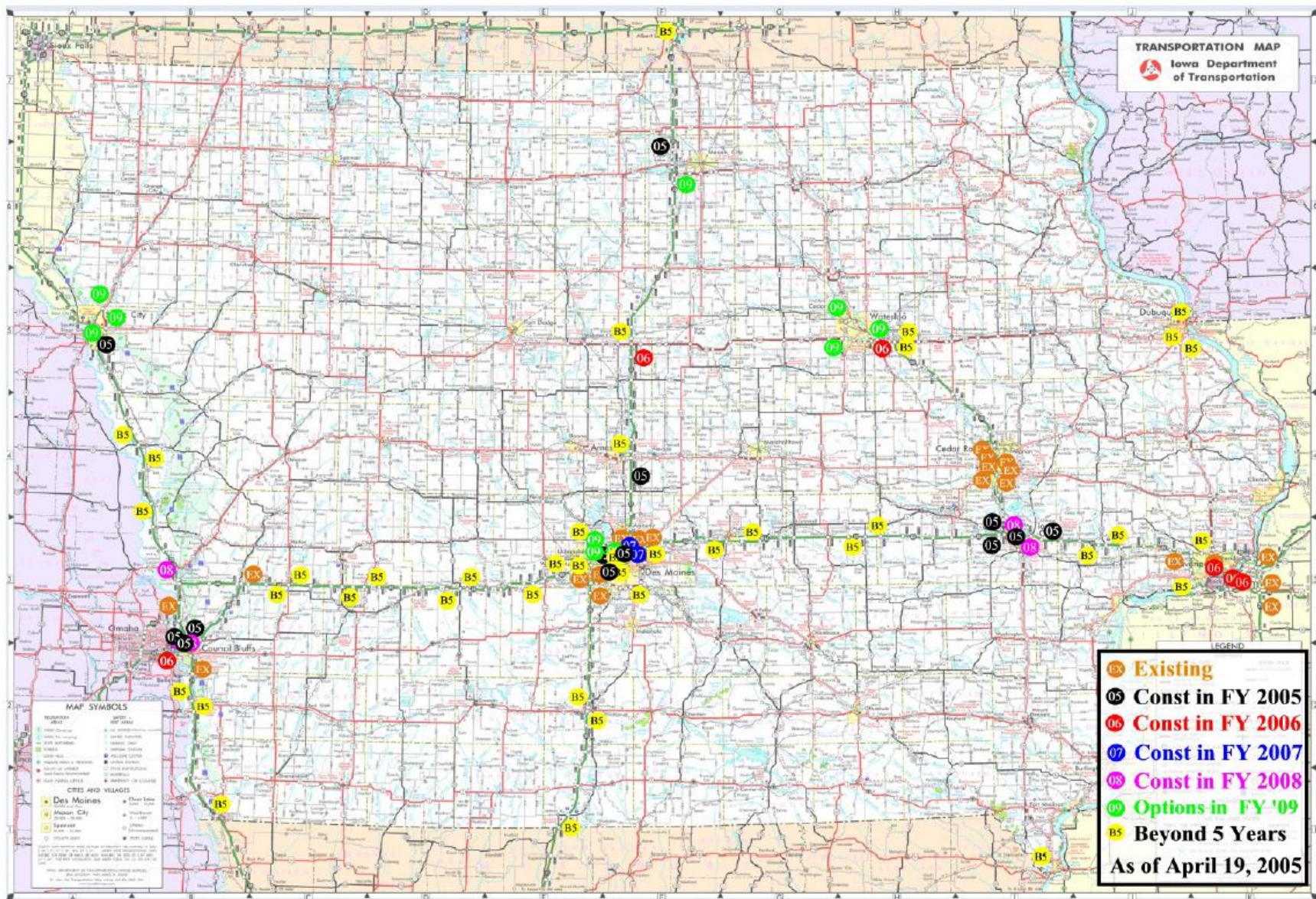


Figure 4-1. Iowa DOT Dynamic Message Sign Locations

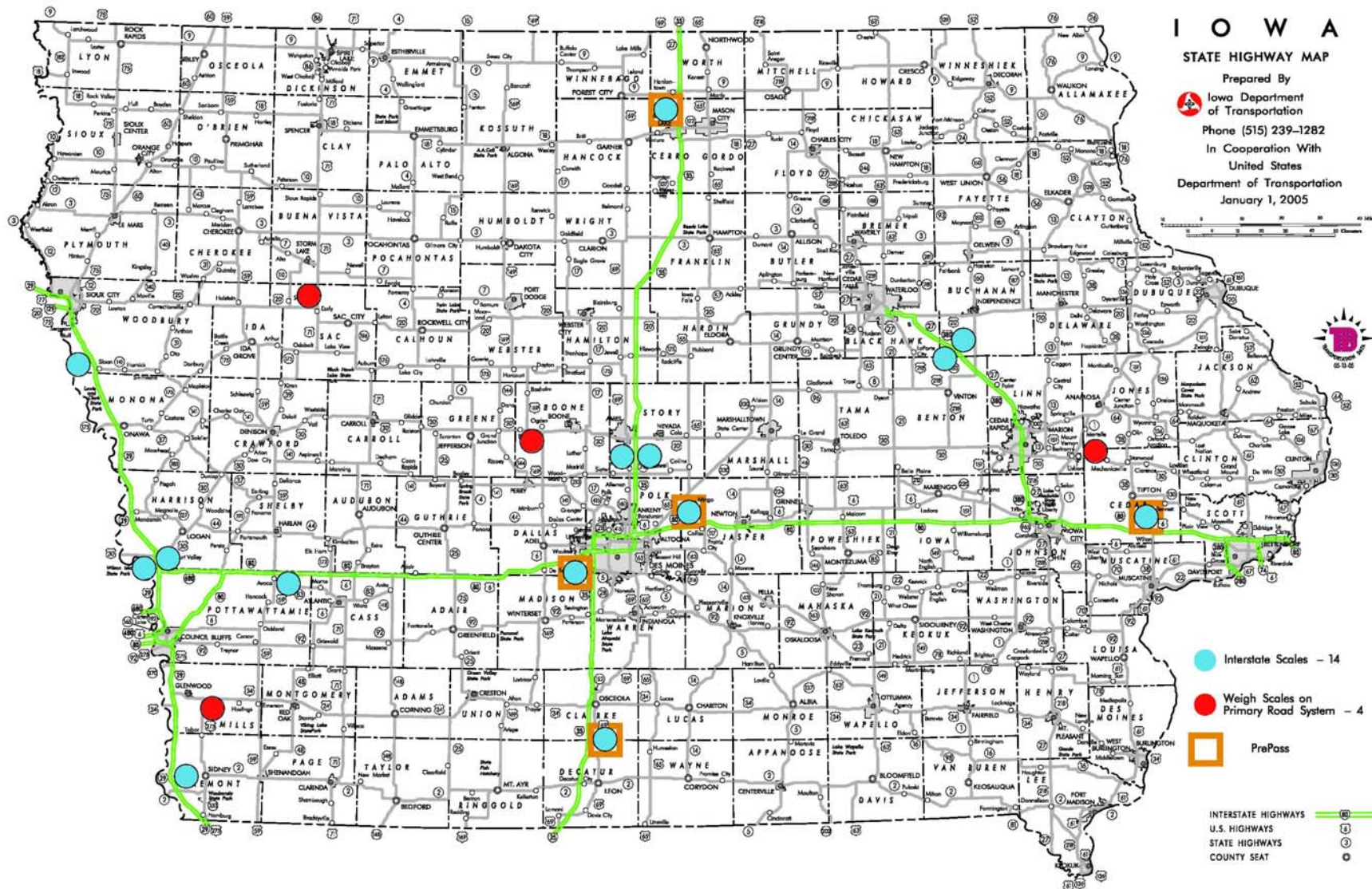


Figure 4-2. Iowa DOT Weigh Scale Locations

AUTOMATIC TRAFFIC RECORDER LOCATIONS

JANUARY 1, 2005

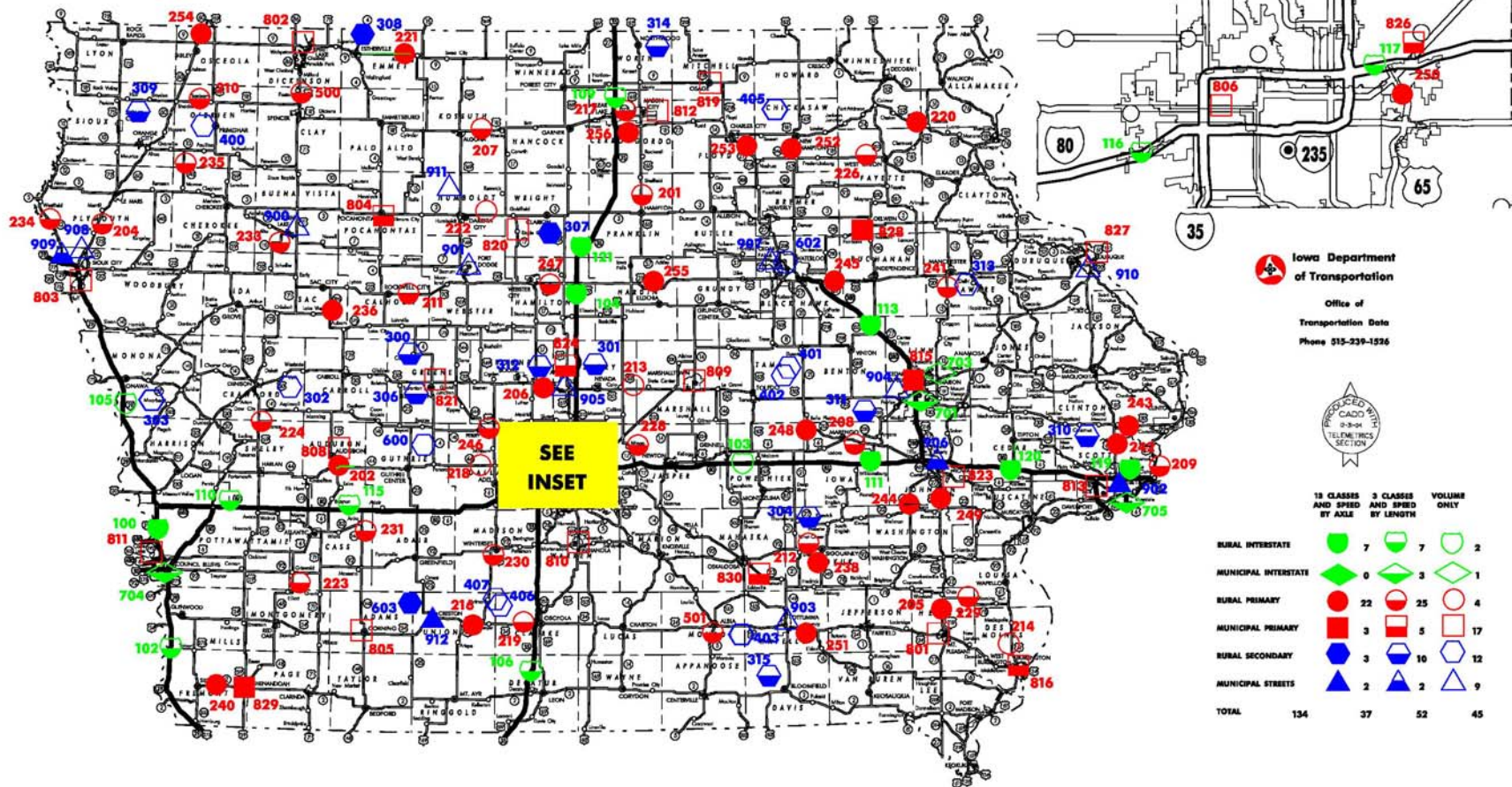


Figure 4-3. Iowa DOT Automatic Traffic Recorder Locations

Large Urban, Small Urban, and Regional Transit Systems

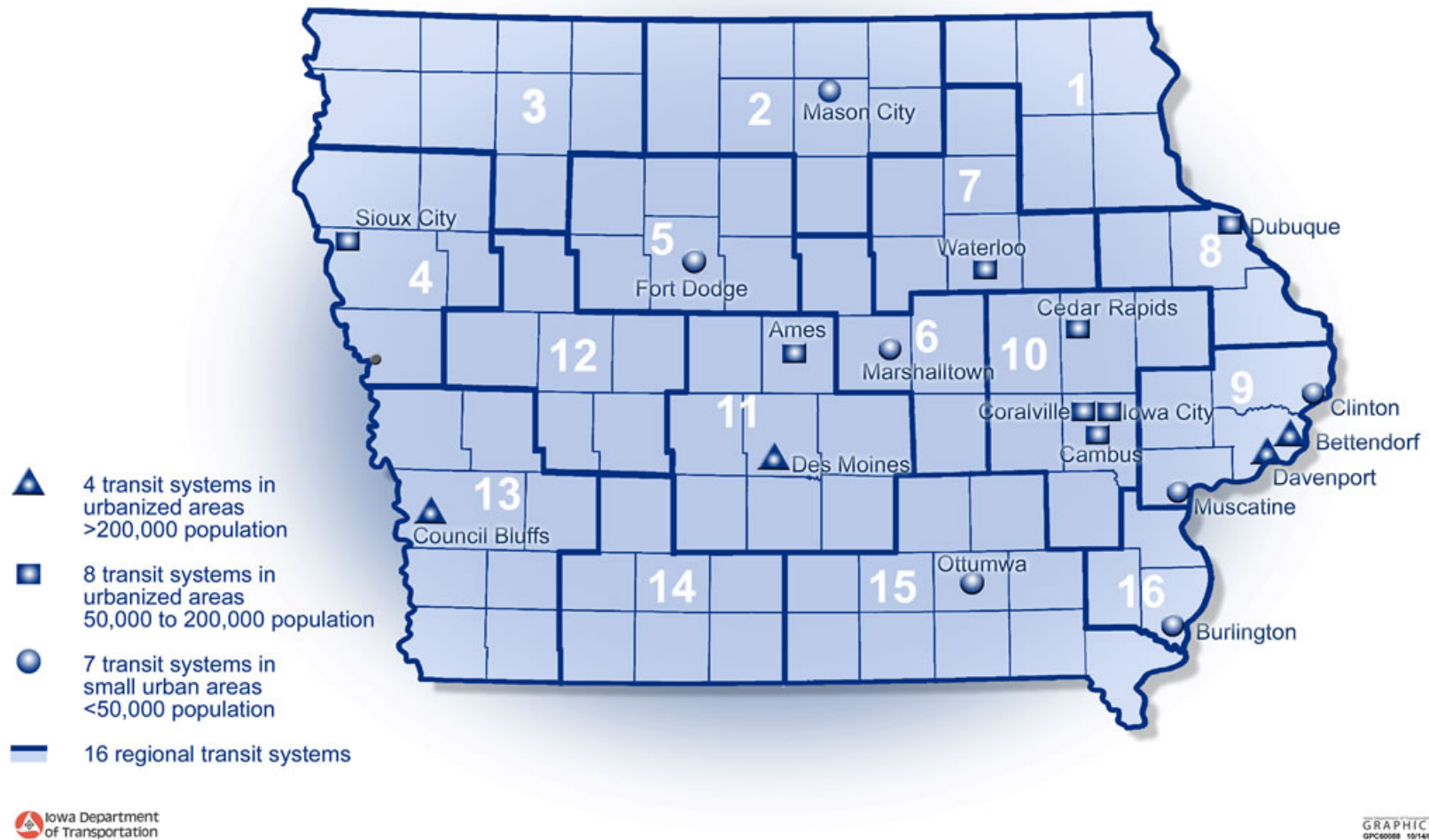
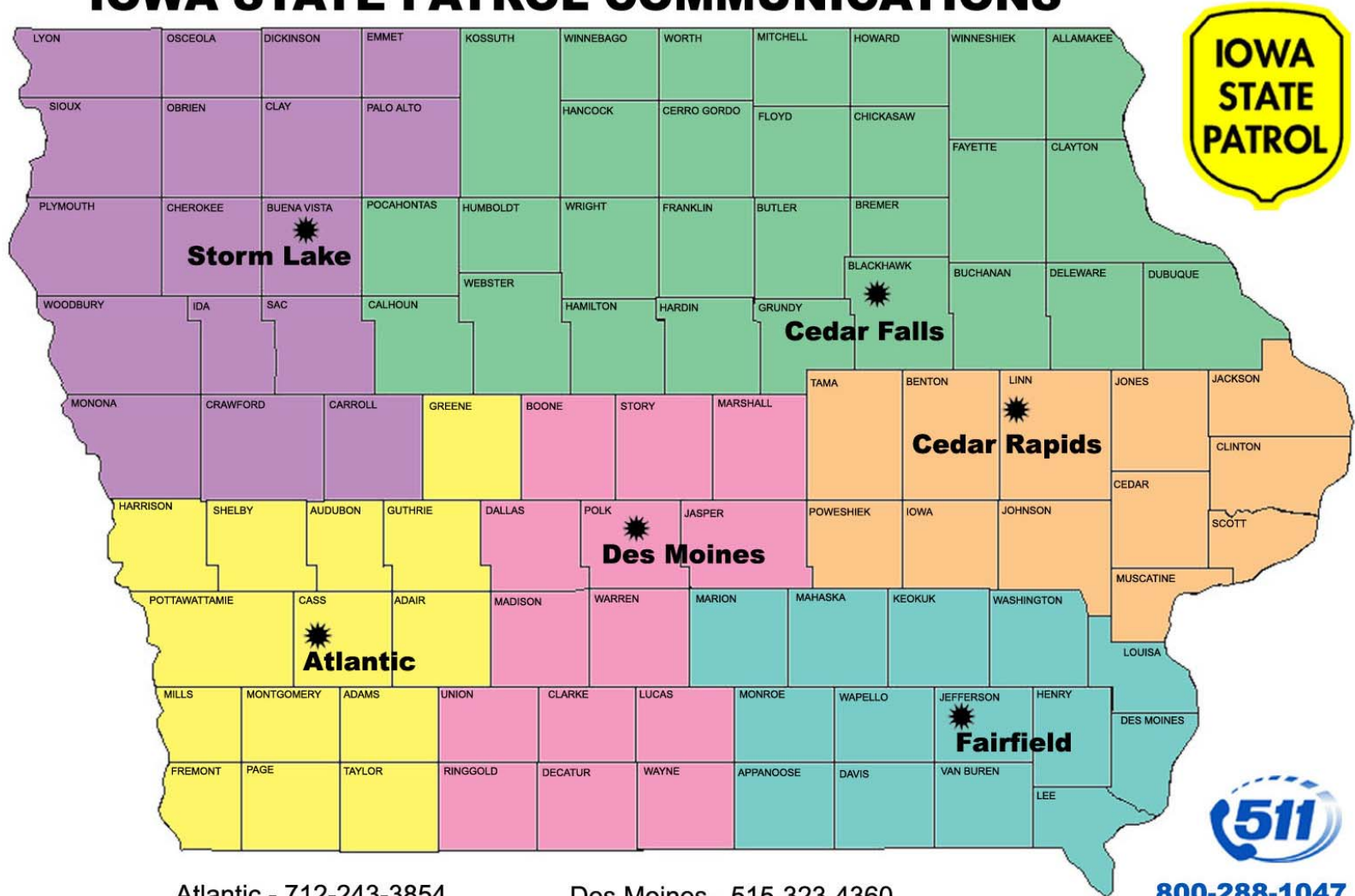


Figure 4-4. Transit Systems in Iowa

IOWA STATE PATROL COMMUNICATIONS



Atlantic - 712-243-3854

Cedar Falls - 319-277-4761

Cedar Rapids - 319-396-4414

Des Moines - 515-323-4360

Fairfield - 641-472-5001

Storm Lake - 712-732-1341

800-288-1047

www.iowaroadconditions.org

Figure 4-5. Iowa State Patrol Communications Center Locations

5. USER SERVICES AND MARKET PACKAGES

5.1 Identification of User Services

User services describe what should be provided from the user's perspective. Identification of users services for the Iowa Statewide ITS Architecture help to understand the problems with transportation systems and the associated needs of stakeholders, and assist in selecting market packages which should support the locally applicable user services. The National ITS Architecture defines thirty-three user services covering a wide breadth of surface transportation needs. Since many of the user service share common infrastructure elements, such as communications, they have been grouped together into eight “bundles” of services, including: (1) Travel and Traffic Management, (2) Public Transportation Management, (3) Electronic Payment, (4) Commercial Vehicle Operations, (5) Emergency Management, (6) Advanced Vehicle Safety Management, (7) Information Management, and (8) Maintenance and Construction Management. Based upon the information obtained form the ITS inventory, stakeholder surveys, regional ITS architectures and planning documents, the user services applicable to the Iowa Statewide ITS Architecture have been identified as shown in Table 4-1. A complete list of user service definitions can be obtained via the National ITS Architecture website at <http://itsarch.iteris.com/itsarch/>.

5.2 Mapping User Services to Market Packages

Market packages provide an accessible, deployment oriented perspective to the National ITS Architecture. They are tailored to fit—separately or in combination—real world transportation problems and needs. Market packages enable transportation planners and decision makers to determine appropriate ITS services that satisfy local and statewide needs. Market packages collect together one or more equipment packages that must work together to deliver a given transportation service and the architecture flows that connect them and other important external systems. In other words, they identify the pieces of the Physical Architecture that are required to implement a particular transportation service. Because they were evaluated during the architecture development, supporting benefits and costs analyses are also available for market packages.

Where user services address the needs or “what” the issues are, market packages address “how” the services or needs are addressed. The relationships between the nationally defined user services and market packages have been established as part of the National ITS Architecture effort. The market packages are directly traceable to the user services and often include capabilities that span more than one user service. Conversely, a single user service sometimes includes a range of incremental capabilities that are segregated into separate market packages so that they may be considered separately from a deployment perspective. As a result, there is often a many-to-many relationship between the market packages and the user services.

As illustrated in Table 5-2, all eight-five (85) market packages (in National ITS Architecture Version 5.1) were considered for their applicability to all thirty-three (33) user services. The user services, market packages and associated mapping relationships, which are applicable for the Iowa Statewide ITS Architecture, have been identified through the mapping exercise.

Table 5-1. List of User Services for Iowa

User Service Bundle	User Service
1. Travel and Traffic Management	1.1 Pre-Trip Information
	1.2 En-Route Driver Information
	1.3 Route Guidance
	1.4 Ride Matching and Reservation
	1.5 Traveler Services Information
	1.6 Traffic Control
	1.7 Incident Management
	1.8 Travel Demand Management
	1.9 Emissions Testing and Mitigation
	1.10 Highway Rail Intersection
2. Public Transportation Management	2.1 Public Transportation Management
	2.2 En-Route Transit Information
	2.3 Personalized Public Transit
	2.4 Public Travel Security
3. Electronic Payment	3.1 Electronic Payment Services
4. Commercial Vehicle Operations	4.1 Commercial Vehicle Electronic Clearance
	4.2 Automated Roadside Safety Inspections
	4.3 On-board Safety Monitoring
	4.4 Commercial Vehicle Administration Processes
	4.5 Hazardous Material Security and Incident Response
	4.6 Freight Mobility
5. Emergency Management	5.1 Emergency Notification and Personal Security
	5.2 Emergency Vehicle Management
	5.3 Disaster Response and Evacuation
6 Advanced Vehicle Safety Systems	6.1 Longitudinal Collision Avoidance
	6.2 Lateral Collision Avoidance
	6.3 Intersection Collision Avoidance
	6.4 Vision Enhancement for Crash Avoidance
	6.5 Safety Readiness
	6.6 Pre-Crash Restraint Deployment
	6.7 Automated Vehicle Operation
7 Information Management	7.1 Archived Data
8 Maintenance and Construction Management	8.1 Maintenance and Construction Operations

Note: User services shown as gray indicate that they are not applicable to the Iowa Statewide ITS Architecture.

Table 5-2. User Services Mapping to Market Packages

[illegible]

Note: Items colored in Gray indicated that the items are not applicable to the Iowa Statewide ITS Architecture.

Table 5-3 presents a list of market packages that are identified through the mapping process in Table 5-2. The market packages are grouped according to the type of ITS category they fall under, i.e., Archived Data Management, Advanced Public Transportation Systems, etc. As illustrated in Table 5-3, some of the market packages do not specifically address the user services identified for the Iowa Statewide ITS Architecture, and they are not applicable to the implementation of the existing and proposed ITS systems in Iowa. Therefore, a customization of the market packages is necessary so that the market packages that are inappropriate for the Iowa ITS statewide ITS architecture are eliminated. Descriptions of the market packages can be found via the National ITS Architecture website at <http://itsarch.iteris.com/itsarch/>.

Table 5-3. List of Market Packages for Iowa Statewide ITS Architecture

Category	Market Package	Market Package Name	Status
Archived Data Management (AD)	AD1	ITS Data Mart	Existing
	AD2	ITS Data Warehouse	Existing
Advanced Public Transportation Systems (APTS)	APTS01	Transit Vehicle Tracking	Existing
	APTS02	Transit Fixed Route Operations	Existing
	APTS03	Demand Response Transit Operations	Existing
	APTS04	Transit Passenger and Fare Management	Existing
	APTS05	Transit Security	Existing
	APTS06	Transit Maintenance	Existing
	APTS07	Multi-Modal Coordination	Planned
	APTS08	Transit Traveler Information	Existing
Advanced Traveler Information Systems (ATIS)	ATIS01	Broadcast Traveler Information	Existing
	ATIS02	Interactive Traveler Information	Existing
	ATIS07	Yellow Pages and Reservation	Planned
	ATIS09	In-Vehicle Signing	Planned
Advanced Traffic Management Systems (ATMS)	ATMS01	Network Surveillance	Existing
	ATMS03	Surface Street Control	Existing
	ATMS04	Freeway Control	Planned
	ATMS06	Traffic Information Dissemination	Existing
	ATMS07	Regional Traffic Control	Planned
	ATMS08	Traffic Incident Management System	Existing
	ATMS09	Traffic Forecast and Demand Management	Planned
	ATMS11	Emissions Monitoring and Management	Existing
	ATMS13	Standard Railroad Grade Crossing	Existing
	ATMS14	Advanced Railroad Grade Crossing	Planned
	ATMS15	Railroad Operations Coordination	Planned
	ATMS16	Parking Facility Management	Existing
	ATMS19	Speed Monitoring	Planned
	ATMS21	Roadway Closure Management	Planned
Commercial Vehicle Operations (CVO)	CVO03	Electronic Clearance	Existing
	CVO04	CV Administrative Processes	Existing
	CVO06	Weigh In Motion	Existing
	CVO07	Roadside CVO Safety	Existing

Category	Market Package	Market Package Name	Status
Emergency Management (EM)	CVO10	HAZMAT Management	Planned
	CVO11	Roadside HAZMAT Security Detection and Mitigation	Existing
	EM01	Emergency Call-Taking and Dispatch	Existing
	EM02	Emergency Routing	Existing
	EM03	Mayday Support	Planned
	EM04	Roadway Service Patrols	Existing
	EM05	Transportation Infrastructure Protection	Existing
	EM06	Wide-Area Alert	Existing
	EM07	Early Warning System	Existing
	EM08	Disaster Response and Recovery	Existing
Maintenance & Construction Management (MC)	EM09	Evacuation and Reentry Management	Existing
	EM10	Disaster Traveler Information	Existing
	MC01	Maintenance and Construction Vehicle and Equipment Tracking	Existing
	MC02	Maintenance and Construction Vehicle Maintenance	Existing
	MC03	Road Weather Data Collection	Existing
	MC04	Weather Information Processing and Distribution	Existing
	MC05	Roadway Automated Treatment	Existing
	MC06	Winter Maintenance	Existing
	MC07	Roadway Maintenance and Construction	Existing
	MC08	Work Zone Management	Existing
	MC09	Work Zone Safety Monitoring	Planned
	MC10	Maintenance and Construction Activity Coordination	Existing

5.3 Customization of Market Packages

Market packages, customized for the specific requirements of each stakeholder, represent the information that will be exchanged between specific stakeholder elements. The above market packages selected for the Iowa Statewide ITS Architecture were customized to correspond with the existing ITS system elements and operations as well as future deployment and planned operations. Customization of market packages requires tailoring the elements (subsystems or terminators) in these market packages, along with associated architecture flows. In addition, architecture flows deemed by the stakeholders as not relevant to the deployment need to be removed. The results of such customization are summarized in terms of ITS elements and their deployment status as presented in Table 5-4. Completed results of the customization are detailed in the Turbo Architecture database.

Table 5-4. List of Market Packages by Architecture Elements

Market Package	Market Package Name	Associated Element	Status
AD1	ITS Data Mart	City Police Departments	Existing
		City Public Works Traffic and Maintenance Database	Existing
		County and City 911 Dispatch Centers	Existing
		County Engineer Offices	Existing
		County Engineer Traffic and Maintenance Database	Existing
		County Sheriff Offices	Existing
		Iowa DOT Dist Databases	Existing
		Iowa DOT Dist Operations Offices	Existing
		Iowa DOT Maint and Const Offices/Garages	Existing
		Iowa DOT Aviation Office Automated Weather Observing Stations	Existing
		Iowa DOT Aviation Office Aviation Weather System	Existing
		Iowa DOT MVD Administration	Existing
		Iowa DOT Transportation Office Database	Existing
		Iowa DOT/Illinois DOT I-74 Bridge Incident Management Warning System	Existing
		Iowa DOT RWIS Central System	Existing
		Large Urban Transit Agencies	Existing
		Large Urban Transit Agencies Transit Database	Existing
		Metropolitan Planning Organizations Database	Existing
		Regional Transit Authorities	Existing
		Regional Transit Authorities Transit Database	Existing
		Small Urban Transit Agencies	Existing
		Small Urban Transit Agencies Transit Database	Existing
AD2	ITS Data Warehouse	City Police Departments	Existing
		County Sheriff Offices	Existing
		Iowa DOT CARS	Existing
		Iowa DOT Maint and Const Offices/Garages	Existing
		Iowa DOT MVD Administration	Existing
		Iowa State Patrol Districts	Existing
		Iowa TraCS	Existing
APTS1	Transit Vehicle Tracking	Large Urban Transit Agencies	Existing
		Large Urban Transit Agencies Transit Vehicles	Existing
		Regional Transit Authorities	Existing
		Regional Transit Authorities Transit Vehicles	Existing
		Small Urban Transit Agencies	Planned
		Small Urban Transit Agencies Transit Vehicles	Planned
APTS2	Transit Fixed-Route Operations	Large Urban Transit Agencies	Existing
		Large Urban Transit Agencies Transit Vehicles	Existing
		Regional Transit Authorities	Existing
		Regional Transit Authorities Transit Vehicles	Existing
		Small Urban Transit Agencies	Existing
		Small Urban Transit Agencies Transit Vehicles	Existing
APTS3	Demand Response Transit	Large Urban Transit Agencies	Existing

Market Package	Market Package Name	Associated Element	Status
	Operations	Large Urban Transit Agencies Transit Vehicles	Existing
		Regional Transit Authorities	Existing
		Regional Transit Authorities Transit Vehicles	Existing
		Small Urban Transit Agencies	Existing
		Small Urban Transit Agencies Transit Vehicles	Existing
APTS4	Transit Passenger and Fare Management	Large Urban Transit Agencies	Existing
		Large Urban Transit Agencies Kiosks	Planned
		Large Urban Transit Agencies Transit Card	Existing
		Large Urban Transit Agencies Transit Vehicles	Existing
		Regional Transit Authorities	Planned
		Regional Transit Authorities Transit Vehicles	Planned
		Small Urban Transit Agencies	Planned
		Small Urban Transit Agencies Transit Vehicles	Planned
APTS5	Transit Security	Large Urban Transit Agencies	Existing
		Large Urban Transit Agencies Security Monitoring Equipment	Existing
		Large Urban Transit Agencies Transit Vehicles	Existing
		Regional Transit Authorities	Existing
		Regional Transit Authorities Security Monitoring Systems	Planned
		Regional Transit Authorities Transit Vehicles	Existing
		Small Urban Transit Agencies	Existing
		Small Urban Transit Agencies Security Monitoring Systems	Planned
		Small Urban Transit Agencies Transit Vehicles	Existing
APTS6	Transit Maintenance	Large Urban Transit Agencies	Existing
		Large Urban Transit Agencies Transit Vehicles	Planned
		Regional Transit Authorities	Existing
		Regional Transit Authorities Transit Vehicles	Planned
		Small Urban Transit Agencies	Existing
APTS7	Multi-modal Coordination	City of Des Moines TMC Roadside Equipment	Planned
		City Public Works Roadside Equipment	Planned
		Large Urban Transit Agencies Transit Vehicles	Planned
		Regional Transit Authorities Transit Vehicles	Planned
		Small Urban Transit Agencies Transit Vehicles	Planned
APTS8	Transit Traveler Information	Large Urban Transit Agencies	Existing
		Large Urban Transit Agencies Bus Stop Traveler Information Notification	Existing
		Large Urban Transit Agencies Kiosks	Existing
		Large Urban Transit Agencies Transit Vehicles	Existing
		Large Urban Transit Agencies Traveler Information Services	Existing
		Regional Transit Authorities	Planned
		Regional Transit Authorities Transit Vehicles	Planned
		Regional Transit Authorities Traveler Information Services	Planned
		Small Urban Transit Agencies	Existing
		Small Urban Transit Agencies Bus Stop Traveler Information Notification	Planned
		Small Urban Transit Agencies Transit Vehicles	Planned

Market Package	Market Package Name	Associated Element	Status
		User Personal Computing Devices	Existing
ATIS1	Broadcast Traveler Information	City Cable TV Channels	Existing
		County and City Websites	Existing
		Des Moines International Airport	Existing
		Iowa DOT	Existing
		Iowa DOT 511 Travel Information Website	Existing
		Iowa DOT CARS	Existing
		Iowa DOT Rest Areas Weather Display Systems	Existing
		Iowa DOT WeatherView Website	Existing
		Large Urban Transit Agencies Traveler Information Services	Existing
		Media	Existing
		Regional Transit Authorities Traveler Information Services	Existing
		Small Urban Transit Agencies Traveler Information Services	Existing
		User Personal Computing Devices	Existing
ATIS2	Interactive Traveler Information	Iowa DOT 511 Travel Information Website	Existing
		Iowa DOT 511 Traveler Information System	Existing
		Iowa DOT CARS	Existing
		Iowa DOT I-235 Construction Website	Existing
		Iowa DOT Rest Areas Kiosks	Planned
		Iowa DOT Rest Areas WiFi	Existing
		Iowa DOT WeatherView Website	Existing
		Iowa DOT/Illinois DOT I-74 Bridge Incident Management Warning System	Planned
		Iowa DOT/Illinois DOT I-74 Bridge Incident Management Warning System Kiosks	Planned
		Large Urban Transit Agencies Traveler Information Services	Existing
		Regional Transit Authorities Traveler Information Services	Existing
		Small Urban Transit Agencies Traveler Information Services	Existing
		Telecommunications System for Traveler Information	Existing
		User Personal Computing Devices	Existing
ATIS7	Yellow Pages and Reservation	Iowa DOT Rest Areas Kiosks	Planned
		Yellow Pages Service Providers	Existing
ATIS9	In Vehicle Signing	Iowa DOT/Illinois DOT I-74 Bridge Incident Management Warning System	Planned
		Iowa DOT/Illinois DOT I-74 Bridge Incident Management Warning System Roadside Equipment	Planned
ATMS01	Network Surveillance	City of Des Moines TMC	Planned
		City of Des Moines TMC Roadside Equipment	Planned
		City Public Works Departments	Existing
		City Public Works Roadside Equipment	Existing
		County Engineer Offices	Planned
		County Engineer Roadside Equipment	Planned
		Iowa DOT Dist Operations Offices	Existing
		Iowa DOT I-80 Incident Management Warning System	Planned

Market Package	Market Package Name	Associated Element	Status
		Iowa DOT I-80 Incident Management Warning System Roadside Equipment	Planned
		Iowa DOT Maint and Const Offices/Garages	Existing
		Iowa DOT Traffic Surveillance Equipment	Existing
		Iowa DOT TripGuide	Existing
		Iowa DOT TripGuide Roadside Equipment	Existing
		Iowa DOT Vehicle Detection Stations	Existing
		Iowa DOT/Illinois DOT I-74 Bridge Incident Management Warning System	Planned
		Iowa DOT/Illinois DOT I-74 Bridge Incident Management Warning	Planned
ATMS03	Surface Street Control	City of Des Moines TMC	Existing
		City of Des Moines TMC Roadside Equipment	Existing
		City Police Departments	Existing
		City Police Red Light Running Cameras	Existing
		City Public Works Departments	Existing
		City Public Works Roadside Equipment	Existing
		County Engineer Offices	Existing
		County Engineer Roadside Equipment	Existing
		Iowa DOT Pedestrian Safety Systems	Existing
ATMS04	Freeway Control	Iowa DOT/Illinois DOT I-74 Bridge Incident Management Warning System	Planned
		Iowa DOT/Illinois DOT I-74 Bridge Incident Management Warning System Roadside Equipment	Planned
ATMS06	Traffic Information Dissemination	City of Des Moines TMC	Planned
		City of Des Moines TMC Roadside Equipment	Planned
		City Public Works Departments	Existing
		City Public Works Roadside Equipment	Existing
		City Public Works Slippery Conditions Warning System	Planned
		County and City 911 Dispatch Centers	Existing
		County Engineer Offices	Planned
		County Engineer Roadside Equipment	Planned
		Drivers	Existing
		Iowa DOT	Existing
		Iowa DOT CARS	Planned
		Iowa DOT Dist Operations Offices	Existing
		Iowa DOT DMS	Existing
		Iowa DOT HAR and LPFM	Existing
		Iowa DOT I-80 Incident Management Warning System	Planned
		Iowa DOT I-80 Incident Management Warning System Roadside Equipment	Planned
		Iowa DOT Maint and Const Offices/Garages	Existing
		Iowa DOT Overheight Warning System	Existing
		Iowa DOT Rest Areas DMS	Planned
		Iowa DOT TripGuide	Existing
		Iowa DOT TripGuide Roadside Equipment	Existing

Market Package	Market Package Name	Associated Element	Status
		Iowa DOT/Illinois DOT I-74 Bridge Incident Management Warning System	Planned
		Iowa DOT/Illinois DOT I-74 Bridge Incident Management Warning System Roadside Equipment	Planned
		Iowa State Patrol Communications Centers	Planned
ATMS07	Regional Traffic Control	City of Des Moines TMC	Planned
		City Public Works Departments	Planned
		Iowa DOT Dist Operations Offices	Planned
		Iowa DOT I-80 Incident Management Warning System	Planned
		Iowa DOT TripGuide	Planned
		Iowa DOT/Illinois DOT I-74 Bridge Incident Management Warning System	Planned
		Neighboring States Counties and Cities Traffic and Maintenance	Planned
		Neighboring States DOT/DOR	Planned
ATMS08	Traffic Incident Management System	City Fire Departments	Existing
		City of Des Moines TMC	Existing
		City of Des Moines TMC Roadside Equipment	Planned
		City Police Departments	Existing
		City Public Works Departments	Existing
		City Public Works Roadside Equipment	Existing
		County and City 911 Dispatch Centers	Existing
		County and City 911 Dispatch Centers Emergency Vehicles	Existing
		County Emergency Operation Centers	Existing
		County Engineer Offices	Existing
		County Engineer Roadside Equipment	Planned
		County Sheriff Offices	Existing
		Des Moines International Airport	Existing
		Iowa DOT Dist Operations Offices	Existing
		Iowa DOT I-80 Incident Management Warning System	Planned
		Iowa DOT I-80 Incident Management Warning System Roadside Equipment	Planned
		Iowa DOT Maint and Const Offices/Garages	Existing
		Iowa DOT Traffic Surveillance Equipment	Existing
		Iowa DOT TripGuide	Existing
		Iowa DOT TripGuide Roadside Equipment	Existing
		Iowa DOT/Illinois DOT I-74 Bridge Incident Management Warning System	Planned
		Iowa DOT/Illinois DOT I-74 Bridge Incident Management Warning System Roadside Equipment	Planned
		Iowa State Patrol Communications Centers	Existing
		Iowa State Patrol Districts	Existing
		Iowa State Patrol Vehicles	Existing
		Iowa TraCS	Existing
		Large Urban Transit Agencies	Existing
		Neighboring States Counties and Cities Public Safety Agencies	Existing
		Neighboring States Counties and Cities Traffic and Maintenance	Existing

Market Package	Market Package Name	Associated Element	Status
		Neighboring States DOT/DOR	Existing
		Neighboring States State Patrol	Existing
		Railroad Companies	Existing
		Regional Transit Authorities	Existing
		Small Urban Transit Agencies	Existing
ATMS09	Traffic Forecast and Demand Management	Bi-state Regional Commission	Planned
		Iowa DOT/Illinois DOT I-74 Bridge Incident Management Warning System	Planned
ATMS11	Emissions Monitoring and Management	Bi-state Regional Commission	Planned
		County and City Air Quality Monitoring Stations	Existing
		County and City Air Quality Monitoring Systems	Existing
		Iowa DOT/Illinois DOT I-74 Bridge Incident Management Warning System	Planned
ATMS13	Standard Railroad Grade Crossing	City of Des Moines TMC	Existing
		City of Des Moines TMC Roadside Equipment	Existing
		City Public Works Departments	Existing
		City Public Works Railroad Crossing Warning Systems	Existing
		City Public Works Roadside Equipment	Existing
		Railroad Companies	Existing
		Railroad Wayside Equipment	Existing
ATMS14	Advanced Railroad Grade Crossing	City of Des Moines TMC	Planned
		City of Des Moines TMC Roadside Equipment	Planned
		Railroad Companies	Planned
		Railroad Wayside Equipment	Planned
ATMS15	Railroad Operations Coordination	City Public Works Departments	Planned
		Iowa DOT/Illinois DOT I-74 Bridge Incident Management Warning System	Planned
		Railroad Companies	Planned
ATMS16	Parking Facility Management	City of Council Bluffs MAC Parking Management System	Existing
		City of Des Moines Parking Card	Existing
		City of Des Moines Parking Management System	Existing
		Drivers	Existing
ATMS19	Speed Monitoring	County and City 911 Dispatch Centers	Planned
		Iowa DOT Dist Operations Offices	Planned
		Iowa DOT Dynamic Speed Zone Sign System	Planned
		Iowa DOT/Illinois DOT I-74 Bridge Incident Management Warning System	Planned
		Iowa DOT/Illinois DOT I-74 Bridge Incident Management Warning System Roadside Equipment	Planned
		Iowa State Patrol Communications Centers	Planned
ATMS21	Roadway Closure Management	Iowa DOT Automatic Gate Systems	Planned
		Iowa DOT Dist Operations Offices	Planned
		Iowa DOT Maint and Const Offices/Garages	Planned
CVO003	Electronic Clearance	City Police Departments	Existing
		County Sheriff Offices	Existing

Market Package	Market Package Name	Associated Element	Status
		Iowa DOT MVD Administration	Existing
		Private Trucking Companies Commercial Vehicles	Existing
		Iowa DOT MVD CVO Inspector	Existing
		Iowa DOT MVD Enforcement	Existing
		Iowa DOT MVD PrePass System	Existing
		Iowa State Patrol Districts	Existing
CVO04	CV Administrative Processes	City Police Departments	Existing
		County Sheriff Offices	Existing
		FMCSA Motor Carrier Management System	Existing
		Iowa DOT MVD Administration	Existing
		IFTA Clearinghouse	Existing
		Iowa State Patrol Districts	Existing
		IRP Clearinghouse	Existing
		Private Trucking Companies	Existing
CVO006	Weigh-In-Motion	Iowa DOT MVD Weigh-in-Motion Scales	Existing
		Private Trucking Companies Commercial Vehicles	Existing
CVO07	Roadside CVO Safety	City Police Departments	Existing
		County Sheriff Offices	Existing
		Iowa DOT MVD Administration	Existing
		Iowa DOT MVD CVO Inspector	Existing
		Iowa DOT MVD Enforcement	Existing
		Iowa DOT MVD PrePass System	Existing
		Iowa State Patrol Districts	Existing
		Private Trucking Companies	Existing
		Private Trucking Companies Commercial Vehicles	Existing
CVO10	HAZMAT Management	County and City 911 Dispatch Centers	Existing
		Iowa DOT/Illinois DOT I-74 Bridge Incident Management Warning System	Planned
		Iowa State Patrol Communications Centers	Existing
		Private Trucking Companies Commercial Vehicles	Existing
CVO11	Roadside HAZMAT Security Detection and Mitigation	Commercial Vehicle Freight Equipment	Existing
		Iowa DOT MVD Radiation Detection Equipment	Existing
EM01	Emergency Call-Taking and Dispatch	County and City 911 Dispatch Centers	Existing
		County and City 911 Dispatch Centers Emergency Vehicles	Existing
		Iowa State Patrol Communications Centers	Existing
		Iowa State Patrol Vehicles	Existing
EM02	Emergency Routing	City of Des Moines TMC	Existing
		City Public Works Departments	Existing
		City Public Works Roadside Equipment	Existing
		County and City 911 Dispatch Centers	Existing
		County and City 911 Dispatch Centers Emergency Vehicles	Existing
		County Engineer Offices	Existing
		Iowa DOT I-80 Incident Management Warning System	Planned
		Iowa DOT Maint and Const Offices/Garages	Existing

Market Package	Market Package Name	Associated Element	Status
		Iowa DOT TripGuide	Existing
		Iowa DOT/Illinois DOT I-74 Bridge Incident Management Warning System	Planned
		Iowa State Patrol Communications Centers	Existing
		Iowa State Patrol Vehicles	Existing
EM03	Mayday and Alarms Support	Iowa DOT/Illinois DOT I-74 Bridge Incident Management Warning System	Planned
		Traffic Vehicles	Planned
EM04	Roadway Service Patrols	Iowa DOT Highway Helper Vehicles	Existing
		Iowa DOT TripGuide	Existing
EM05	Transportation Infrastructure Protection	Iowa DOT	Planned
		Iowa DOT Lighting Towers Monitoring Equipment	Existing
		Iowa DOT Maint and Const Offices/Garages	Existing
		Iowa DOT Rest Areas Security Cameras	Planned
		Iowa State Patrol Communications Centers	Existing
		Iowa State Patrol Security Monitoring Systems	Existing
EM06	Wide-Area Alert	City Cable TV Channels	Existing
		City Police Departments	Existing
		County and City 911 Dispatch Centers	Existing
		County and City Websites	Existing
		County Emergency Operation Centers	Existing
		County Sheriff Offices	Existing
		Iowa DOT 511 Travel Information Website	Existing
		Iowa DOT DMS	Existing
		Iowa DOT HAR and LPFM	Existing
		Iowa DOT Rest Areas DMS	Planned
		Iowa DOT Rest Areas Kiosks	Planned
		Iowa DOT Rest Areas WiFi	Existing
		Iowa HLSEM Statewide Emergency Operation Center	Existing
		Iowa State Patrol	Existing
		Iowa State Patrol Communications Centers	Existing
EM07	Early Warning System	City Public Works Departments	Existing
		City Public Works Flood Level Monitoring Systems	Existing
		Iowa State Patrol Communications Centers	Existing
		Iowa State Patrol Security Monitoring Systems	Existing
EM08	Disaster Response and Recovery	City Fire Departments	Existing
		City of Des Moines TMC	Existing
		City Police Departments	Existing
		City Public Works Departments	Existing
		County and City 911 Dispatch Centers	Existing
		County Emergency Operation Centers	Existing
		County Engineer Offices	Existing
		County Sheriff Offices	Existing
		Des Moines International Airport	Existing
		Iowa DOT	Existing

Market Package	Market Package Name	Associated Element	Status
		Iowa DOT Dist Operations Offices	Existing
		Iowa DOT Maint and Const Offices/Garages	Existing
		Iowa HLSEM Statewide Emergency Operation Center	Existing
		Iowa State Patrol	Existing
		Iowa State Patrol Communications Centers	Existing
		Iowa State Patrol Districts	Existing
		Large Urban Transit Agencies	Existing
		Railroad Companies	Existing
		Regional Transit Authorities	Existing
		Small Urban Transit Agencies	Existing
EM09	Evacuation and Reentry Management	City Police Departments	Existing
		City Public Works Departments	Existing
		County and City 911 Dispatch Centers	Existing
		County Emergency Operation Centers	Existing
		County Engineer Offices	Existing
		County Sheriff Offices	Existing
		Iowa DOT	Existing
		Iowa DOT Dist Operations Offices	Existing
		Iowa DOT Maint and Const Offices/Garages	Existing
		Iowa HLSEM Statewide Emergency Operation Center	Existing
		Iowa State Patrol	Existing
		Iowa State Patrol Communications Centers	Existing
		Iowa State Patrol Districts	Existing
		Large Urban Transit Agencies	Existing
		Regional Transit Authorities	Existing
		Small Urban Transit Agencies	Existing
EM10	Disaster Traveler Information	City Cable TV Channels	Existing
		City Police Departments	Existing
		County and City 911 Dispatch Centers	Existing
		County and City Websites	Existing
		County Emergency Operation Centers	Existing
		County Sheriff Offices	Existing
		Iowa DOT 511 Travel Information Website	Existing
		Iowa HLSEM Statewide Emergency Operation Center	Existing
		Iowa State Patrol	Existing
		Iowa State Patrol Communications Centers	Existing
		Iowa State Patrol Districts	Existing
		Media	Existing
		User Personal Computing Devices	Existing
MC01	Maintenance and Construction Vehicle and Equipment Tracking	City Public Works Departments	Planned
		City Public Works Maintenance and Construction Vehicles	Planned
		County Engineer Maintenance and Construction Vehicles	Planned
		County Engineer Offices	Planned
		Iowa DOT Maint and Const Offices/Garages	Existing

Market Package	Market Package Name	Associated Element	Status
		Iowa DOT Maint and Const Offices/Garages Vehicles	Existing
MC02	Maintenance and Construction Vehicle Maintenance	City Public Works Departments	Existing
		County Engineer Offices	Existing
		Iowa DOT Maint and Const Offices/Garages	Existing
		Iowa DOT Maint and Const Offices/Garages Vehicles	Planned
MC03	Road Weather Data Collection	City Public Works Departments	Existing
		City Public Works Roadside Equipment	Existing
		County Engineer Maintenance and Construction Vehicles	Existing
		County Engineer Offices	Existing
		County Engineer Roadside Equipment	Existing
		Iowa DOT I-80 Incident Management Warning System	Planned
		Iowa DOT I-80 Incident Management Warning System Roadside Equipment	Planned
		Iowa DOT Maint and Const Offices/Garages	Existing
		Iowa DOT Maint and Const Offices/Garages Vehicles	Planned
		Iowa DOT Aviation Office Automated Weather Observing Stations	Existing
		Iowa DOT Aviation Office Aviation Weather System	Existing
		Iowa DOT Road Surface Detection Cameras	Existing
		Iowa DOT RWIS Central System	Existing
		Iowa DOT RWIS Stations	Existing
		Iowa DOT/Illinois DOT I-74 Bridge Incident Management Warning System	Planned
		Iowa DOT/Illinois DOT I-74 Bridge Incident Management Warning System Roadside Equipment	Planned
		National Weather Service	Existing
		Private Weather Service Providers	Existing
MC04	Weather Information Processing and Distribution	City Public Works Departments	Existing
		County and City 911 Dispatch Centers	Existing
		Iowa DOT 511 Travel Information Website	Existing
		Iowa DOT 511 Traveler Information System	Existing
		Iowa DOT Highway Div Maint Office Automated Notification System	Planned
		Iowa DOT I-80 Incident Management Warning System	Planned
		Iowa DOT Maint and Const Offices/Garages	Existing
		Iowa DOT RWIS Central System	Existing
		Iowa DOT TripGuide	Existing
		Iowa DOT WeatherView Website	Existing
		Iowa DOT/Illinois DOT I-74 Bridge Incident Management Warning System	Planned
		National Weather Service	Existing
		Private Weather Service Providers	Existing
MC05	Roadway Automated Treatment	City Public Works Anti-Icing System	Planned
		City Public Works Departments	Planned
		Iowa DOT Anti-Icing System	Existing
		Iowa DOT Maint and Const Offices/Garages	Existing

Market Package	Market Package Name	Associated Element	Status
MC06	Winter Maintenance	City Public Works Departments	Existing
		City Public Works Maintenance and Construction Vehicles	Existing
		County Engineer Maintenance and Construction Vehicles	Existing
		County Engineer Offices	Existing
		Iowa DOT Highway Div Maint Office Winter Road Maint Decision Support System	Planned
		Iowa DOT Maint and Const Offices/Garages	Existing
		Iowa DOT Maint and Const Offices/Garages Vehicles	Existing
MC07	Roadway Maintenance and Construction	City Public Works Departments	Existing
		City Public Works Maintenance and Construction Field Devices	Existing
		City Public Works Maintenance and Construction Vehicles	Existing
		County Engineer Maintenance and Construction Vehicles	Existing
		County Engineer Offices	Existing
		Iowa DOT Maint and Const Offices/Garages	Existing
		Iowa DOT Maint and Const Offices/Garages Field Devices	Existing
		Iowa DOT Maint and Const Offices/Garages Vehicles	Existing
MC08	Work Zone Management	City Public Works Departments	Existing
		City Public Works Maintenance and Construction Field Devices	Existing
		Iowa DOT Maint and Const Offices/Garages	Existing
		Iowa DOT Maint and Const Offices/Garages Field Devices	Existing
MC09	Work Zone Safety Monitoring	Iowa DOT Maint and Const Offices/Garages	Planned
		Iowa DOT Maint and Const Offices/Garages Field Devices	Planned
		Iowa DOT Maint and Const Offices/Garages Vehicles	Planned
MC10	Maintenance and Construction Activity Coordination	City Police Departments	Existing
		City Public Works Departments	Existing
		County and City 911 Dispatch Centers	Existing
		County and City Websites	Existing
		County Engineer Offices	Existing
		County Sheriff Offices	Existing
		Iowa DOT	Existing
		Iowa DOT 511 Travel Information Website	Existing
		Iowa DOT 511 Traveler Information System	Existing
		Iowa DOT Maint and Const Offices/Garages	Existing
		Iowa DOT TripGuide	Existing
		Iowa DOT/Illinois DOT I-74 Bridge Incident Management Warning System	Planned
		Iowa State Patrol Communications Centers	Existing
		Iowa State Patrol Districts	Existing
		Media	Existing
		Railroad Companies	Existing

6. SUBSYSTEMS, EQUIPMENT PACKAGES AND FUNCTIONAL REQUIREMENTS

As one of the required components of an ITS architecture identified in FHWA Final Rule and FTA Policy on ITS Architecture and Standards, this section of the report summarizes the system functional requirements for the Iowa Statewide ITS Architecture in terms of market packages, subsystems, and equipment packages.

6.1 Mapping of Market Packages to Subsystems and Equipment Packages

A market package is implemented with a combination of interrelated equipment; this equipment often resides in several different subsystems within the architecture framework and may be operated by different stakeholders. For instance, the Transit Vehicle Tracking market package includes vehicle location equipment in the Transit Vehicle Subsystem and a base station element in the Transit Management Subsystem. In this example, all market package elements are owned and operated by the same transit stakeholder.

In other cases, the market package elements are owned and operated by different stakeholders. Many of the Advanced Traveler Information Systems (ATIS) market packages require equipment in the Information Service Provider Subsystem that is owned and operated by a public or private information provider and equipment that is acquired and operated by the consumer as part of the Vehicle Subsystem or Personal Information Access Subsystem. Since equipment in different subsystems may be purchased and operated by different end-users, these subsystem-specific components may encounter varied deployment.

To understand and analyze these potential deployment variations, the defined market packages must be decomposed to their constituent elements. The portion of the market package capabilities that are allocated to each subsystem are segregated and defined as equipment packages to support this additional resolution. An equipment package represents a set of equipment/capabilities that are likely to be purchased by an end-user as a component to an overall system. It should be noted that there are no equipment packages defined for the terminators of the National ITS Architecture, as they represent systems on the boundary of the architecture and do not have functional descriptions within the architecture.

Table 6-1 illustrates the subsystems and equipment packages that mapped to the customized list of market packages. The table illustrates the specific market packages in the Iowa Statewide ITS Architecture, the subsystems that are part of the market packages, and the equipment packages that make up the market packages. As indicated in the table, the architecture provides a means to map the market package to appropriate subsystems (components) and equipment packages (technology). The equipment packages identified in Table 6-1 were used to develop the specific functional requirements of each element. The definitions of the equipment packages can be found via the National ITS Architecture website at <http://itsarch.iteris.com/itsarch/>.

Table 6-1. Market Packages, Subsystems and Equipment Packages

Market Package	Market Package Name	Subsystem	Equipment Package
ATMS01	Network Surveillance	Traffic Management	Collect Traffic Surveillance
			Traffic Maintenance
		Roadway Subsystem	Roadway Basic Surveillance
ATMS03	Surface Street Control	Traffic Management	Collect Traffic Surveillance
			TMC Signal Control
			Traffic Maintenance
		Roadway Subsystem	Roadway Signal Controls
			Roadway Basic Surveillance
			Roadway Equipment Coordination
ATMS04	Freeway Control	Traffic Management	Collect Traffic Surveillance
			TMC Freeway Management
			TMC Traffic Information Dissemination
			Traffic Maintenance
		Roadway Subsystem	Roadway Basic Surveillance
			Roadway Equipment Coordination
			Roadway Freeway Control
			Roadway Traffic Information Dissemination
ATMS06	Traffic Information Dissemination	Traffic Management	TMC Traffic Information Dissemination
		Roadway Subsystem	Roadway Traffic Information Dissemination
ATMS07	Regional Traffic Control	Traffic Management	TMC Freeway Management
			TMC Regional Traffic Control
			TMC Signal Control
ATMS08	Traffic Incident Management System	Traffic Management	TMC Incident Detection
			TMC Incident Dispatch Coordination/Communication
		Roadway Subsystem	Roadway Incident Detection
		Emergency Management	Emergency Response Management
			Incident Command
		Maintenance and Construction Management	MCM Incident Management
		Emergency Vehicle	On-board EV Incident Management Communication
ATMS09	Traffic Forecast and Demand Management	Traffic Management	TMC Traffic Network Performance Evaluation
ATMS11	Emissions Monitoring and Management	Emissions Management	Emissions Data Management
		Roadway Subsystem	Roadway Emissions Monitoring
ATMS13	Standard Railroad Grade Crossing	Traffic Management	HRI Traffic Management
		Roadway Subsystem	Standard Rail Crossing
ATMS14	Advanced	Traffic Management	HRI Traffic Management

Market Package	Market Package Name	Subsystem	Equipment Package
	Railroad Grade Crossing	Roadway Subsystem	Advanced Rail Crossing
ATMS15	Railroad Operations Coordination	Traffic Management	Rail Operations Coordination
ATMS16	Parking Facility Management	Parking Management	Parking Electronic Payment
			Parking Management
ATMS19	Speed Monitoring	Traffic Management	TMC Speed Monitoring
		Roadway Subsystem	Roadway Speed Monitoring
			Roadway Equipment Coordination
ATMS21	Roadway Closure Management	Traffic Management	Barrier System Management
			Collect Traffic Surveillance
			TMC Traffic Information Dissemination
		Roadway Subsystem	Field Barrier System Control
			Roadway Basic Surveillance
			Roadway Equipment Coordination
			Roadway Traffic Information Dissemination
		Emergency Management	Emergency Response Management
MC01	Maintenance and Construction Vehicle and Equipment Tracking	Maintenance and Construction Management	MCM Vehicle Tracking
		Maintenance and Construction Vehicle	MCV Vehicle Location Tracking
		Vehicle	Vehicle Location Determination
MC02	Maintenance and Construction Vehicle Maintenance	Maintenance and Construction Management	MCM Vehicle and Equipment Maintenance Management
		Maintenance and Construction Vehicle	MCV Vehicle System Monitoring and Diagnostics
MC03	Road Weather Data Collection	Maintenance and Construction Management	MCM Environmental Information Collection
		Maintenance and Construction Vehicle	MCV Environmental Monitoring
		Emergency Management	Emergency Environmental Monitoring
		Roadway Subsystem	Roadway Environmental Monitoring
MC04	Weather Information Processing and Distribution	Maintenance and Construction Management	MCM Environmental Information Processing
		Traffic Management	TMC Environmental Monitoring
		Emergency Management	Emergency Environmental Monitoring
		Information Service Provider	ISP Traveler Data Collection
MC06	Winter Maintenance	Maintenance and Construction Management	MCM Maintenance Decision Support
			MCM Winter Maintenance Management

Market Package	Market Package Name	Subsystem	Equipment Package
		Maintenance and Construction Vehicle	MCV Winter Maintenance
		Traffic Management	TMC Incident Dispatch Coordination/Communication
MC07	Roadway Maintenance and Construction	Maintenance and Construction Management	MCM Maintenance Decision Support
			MCM Roadway Maintenance and Construction
		Maintenance and Construction Vehicle	MCV Roadway Maintenance and Construction
		Traffic Management	Traffic Maintenance
		Roadway Subsystem	Roadway Field Device Monitoring
MC08	Work Zone Management	Maintenance and Construction Management	MCM Work Zone Management
		Traffic Management	TMC Work Zone Traffic Management
		Roadway Subsystem	Roadway Work Zone Traffic Control
		Maintenance and Construction Vehicle	MCV Work Zone Support
MC09	Work Zone Safety Monitoring	Maintenance and Construction Management	MCM Work Zone Safety Management
		Maintenance and Construction Vehicle	MCV Vehicle Safety Monitoring
		Roadway Subsystem	Roadway Work Zone Safety Roadway Equipment Coordination
MC10	Maintenance and Construction Activity Coordination	Maintenance and Construction Management	MCM Work Activity Coordination
		Emergency Management	Emergency Response Management
		Traffic Management	TMC Work Zone Traffic Management
APTS1	Transit Vehicle Tracking	Transit Management	Transit Center Tracking and Dispatch
		Transit Vehicle Subsystem	On-board Transit Trip Monitoring
		Vehicle	Vehicle Location Determination
APTS2	Transit Fixed-Route Operations	Transit Management	Transit Center Fixed-Route Operations
			Transit Vehicle Operator Scheduling
		Transit Vehicle Subsystem	On-board Fixed Route Schedule Management
APTS3	Demand Response Transit Operations	Transit Management	Transit Center Paratransit Operations
		Transit Vehicle Subsystem	Transit Vehicle Operator Scheduling
APTS4	Transit Passenger and Fare Management	Transit Management	On-board Paratransit Operations
		Transit Management	Transit Center Fare and Load Management
		Transit Vehicle Subsystem	On-board Transit Fare and Load Management
		Remote Traveler Support	Remote Transit Fare Management

Market Package	Market Package Name	Subsystem	Equipment Package
APTS5	Transit Security	Transit Management	Transit Center Security
		Transit Vehicle Subsystem	On-board Transit Security
		Emergency Management	Center Secure Area Surveillance
		Remote Traveler Support	Traveler Secure Area Surveillance
		Security Monitoring Subsystem	Field Secure Area Surveillance
		Emergency Management	Emergency Response Management
APTS6	Transit Maintenance	Transit Management	Transit Garage Maintenance
		Transit Vehicle Subsystem	On-board Maintenance
APTS8	Transit Traveler Information	Transit Management	Transit Center Information Services
		Transit Vehicle Subsystem	On-board Transit Information Services
		Remote Traveler Support	Remote Transit Information Services
		Information Service Provider	Interactive Infrastructure Information
		Personal Information Access	Personal Interactive Information Reception
ATIS1	Broadcast Traveler Information	Information Service Provider	Basic Information Broadcast
			ISP Traveler Data Collection
		Personal Information Access	Personal Basic Information Reception
ATIS2	Interactive Traveler Information	Remote Traveler Support	Remote Basic Information Reception
		Information Service Provider	Traveler Telephone Information
			Interactive Infrastructure Information
			ISP Traveler Data Collection
		Personal Information Access	Personal Interactive Information Reception
ATIS7	Yellow Pages and Reservation	Remote Traveler Support	Remote Interactive Information Reception
		Information Service Provider	Infrastructure Provided Yellow Pages & Reservation
			ISP Traveler Data Collection
ATIS9	In Vehicle Signing	Traffic Management	TMC Input to In-Vehicle Signing
		Roadway Subsystem	Roadway In-Vehicle Signing
CVO03	Electronic Clearance	Commercial Vehicle Administration	CV Information Exchange
			CV Safety Administration
		Commercial Vehicle Check	Citation and Accident Electronic Recording
			Roadside Electronic Screening
CV004	CV Administrative Processes	Commercial Vehicle Subsystem	On-board CV Electronic Data
		Commercial Vehicle Administration	Credentials and Taxes Administration
			CV Information Exchange
		Fleet and Freight	Fleet Administration

Market Package	Market Package Name	Subsystem	Equipment Package
		Management	Fleet Credentials and Taxes Management and Reporting
CVO006	Weigh-In-Motion	Commercial Vehicle Check	Roadside WIM
		Commercial Vehicle Subsystem	On-board CV Electronic Data
CV007	Roadside CVO Safety	Commercial Vehicle Administration	CV Information Exchange
			CV Safety Administration
		Commercial Vehicle Check	Roadside Safety and Security Inspection
			Citation and Accident Electronic Recording
			Roadside Electronic Screening
		Commercial Vehicle Subsystem	On-board CV Electronic Data
CVO10	HAZMAT Management	Commercial Vehicle Subsystem	On-Board Cargo Monitoring
		Emergency Management	Emergency Commercial Vehicle Response
			Mayday Support
CVO11	Roadside HAZMAT Security Detection and Mitigation	Emergency Management	Emergency Commercial Vehicle Response
		Commercial Vehicle Check	Roadside HAZMAT detection
EM01	Emergency Call-Taking and Dispatch	Emergency Management	Emergency Call-Taking
			Emergency Dispatch
		Emergency Vehicle Subsystem	On-board EV Incident Management Communication
EM02	Emergency Routing	Emergency Management	Emergency Routing
		Emergency Vehicle Subsystem	On-board EV En Route Support
		Traffic Management	TMC Incident Dispatch Coordination/Communication
		Roadway Subsystem	Roadway Signal Priority
		Vehicle	Vehicle Location Determination
EM03	Mayday and Alarms Support	Emergency Management	Mayday Support
		Vehicle	Vehicle Mayday I/F
EM04	Roadway Service Patrols	Emergency Management	Service Patrol Management
		Emergency Vehicle Subsystem	On-board EV En Route Support
			On-board EV Incident Management Communication
EM05	Transportation Infrastructure Protection	Emergency Management	Center Secure Area Sensor Management
			Center Secure Area Surveillance
		Security Monitoring Subsystem	Field Secure Area Sensor Monitoring
			Field Secure Area Surveillance
EM06	Wide-Area Alert	Emergency Management	Emergency Early Warning System

Market Package	Market Package Name	Subsystem	Equipment Package
		Information Service Provider	ISP Emergency Traveler Information
			ISP Traveler Data Collection
			Traveler Telephone Information
		Personal Information Access	Personal Basic Information Reception
		Roadway Subsystem	Roadway Traffic Information Dissemination
EM07	Early Warning System	Remote Traveler Support	Remote Basic Information Reception
		Emergency Management	Center Secure Area Sensor Management
			Center Secure Area Surveillance
			Emergency Early Warning System
			Emergency Environmental Monitoring
		Security Monitoring Subs	Field Secure Area Sensor Monitoring
			Field Secure Area Surveillance
EM08	Disaster Response and Recovery	Emergency Management	Emergency Response Management
			Incident Command
		Maintenance and Construction Management	MCM Incident Management
			MCM Roadway Maintenance and Construction
		Traffic Management	TMC Incident Dispatch Coordination/Communication
EM09	Evacuation and Reentry Management	Transit Management	Transit Center Security
		Emergency Management	Emergency Evacuation Support
		Traffic Management	TMC Evacuation Support
		Transit Management	Transit Evacuation Support
EM10	Disaster Traveler Information	Maintenance and Construction Management	MCM Incident Management
		Emergency Management	Emergency Evacuation Support
			Emergency Response Management
		Information Service Provider	ISP Emergency Traveler Information
			ISP Traveler Data Collection
		Personal Information Access	Personal Basic Information Reception
		Remote Traveler Support	Remote Interactive Information Reception
			Remote Basic Information Reception

6.2 Functional Requirements

A functional requirement is a task or activity that is currently performed or is planned to be preformed by each system in the region to provide the required regional ITS services. In the National ITS Architecture, each functional area (i.e. equipment package) has defined several specific functional requirements that are required for performing the equipment package capabilities. These specific functional requirements of the National ITS Architecture are

commonly used as a baseline to develop the functional requirements of a regional ITS architecture.

The process to develop the functional requirements of the Iowa Statewide ITS Architecture begins with the mapping of functional areas to market packages and associated elements as an initial definition of the functions being performed by each element. The functional requirements of each equipment package were then tailored to provide a more accurate picture of the functions performed. Using Turbo Architecture, functional requirements that support the ITS projects for the Statewide region were identified. These functional requirements are listed in Appendix B. The Appendix includes the following information for each ITS element:

- **Element.** Name of the system that will be performing the function
- **Entity.** Describes the National ITS Architecture subsystem to which the element is mapped
- **Functional Area.** Description of the function performed by the element
- **Requirement.** High-level functional requirement to be performed by the element supporting the functional area

To illustrate functions and functional requirements, the ITS element Iowa DOT TripGuide is used as an example. The TripGuide is the Iowa DOT's ITS/traffic management system in Des Moines. In the Statewide ITS Architecture, the TripGuide was mapped to the Traffic Management and Emergency Management subsystems. A market package associated with the TripGuide is Network Surveillance. Two functional areas (equipment packages) are required for the TripGuide to perform the network surveillance capability. They are:

- Collect Traffic Surveillance: This equipment package remotely monitors and controls traffic sensors and surveillance (e.g., CCTV) equipment, and collects, processes and stores the collected traffic data. The collected information is provided to traffic operations personnel and made available to other centers.
- Traffic Maintenance: This equipment package monitors the operational status of field equipment and detects failures. It presents field equipment status to Traffic Operations Personnel and reports failures to the Maintenance and Construction Management Subsystem. The equipment package tracks the repair or replacement of the failed equipment. The entire range of ITS field equipment may be monitored by this equipment package including sensors (traffic, infrastructure, environmental, security, speed, etc.) and devices (highway advisory radio, dynamic message signs, automated roadway treatment systems, barrier and safeguard systems, cameras, traffic signals and override equipment, ramp meters, beacons, security surveillance equipment, etc.).

In the National ITS Architecture, the Collect Traffic Surveillance equipment package contains 7 specific functional requirements and the Traffic Maintenance equipment package has 8. However, not all of the functional requirements are applicable to the Iowa DOT TripGuide. The appropriate functional requirements for each equipment package were tailored and identified in the Table 6-2.

Table 6-2. Functional Requirements: Iowa DOT TripGuide Network Surveillance

Functional Area (Equipment Package)	Functional Requirements	Status
Collection Traffic Surveillance	<ul style="list-style-type: none"> • The center shall monitor, analyze, and store traffic sensor data collected from field elements under remote control of the center. 	Existing
	<ul style="list-style-type: none"> • The center shall monitor, analyze, and distribute traffic images from CCTV systems under remote control of the center. 	Existing
	<ul style="list-style-type: none"> • The center shall distribute road network conditions data (raw or processed) based on collected and analyzed traffic sensor and surveillance data to other centers. 	Existing
	<ul style="list-style-type: none"> • The center shall respond to control data from center personnel regarding sensor and surveillance data collection, analysis, storage, and distribution. 	Existing
	<ul style="list-style-type: none"> • The center shall maintain a database of surveillance and sensors and the freeways, surface street and rural roadways, e.g. where they are located, to which part(s) of the network their data applies, the type of data, and the ownership of each link (that is, the agency or entity responsible for collecting and storing surveillance of the link) in the network. 	Existing
	<ul style="list-style-type: none"> • The center shall support an interface with a map update provider, or other appropriate data sources, through which updates of digitized map data can be obtained and used as a background for traffic data. 	Existing
Traffic Maintenance	<ul style="list-style-type: none"> • The center shall collect and store sensor (traffic, pedestrian, multimodal crossing) operational status. 	Existing
	<ul style="list-style-type: none"> • The center shall collect and store CCTV surveillance system (traffic, pedestrian) operational status. 	Existing
	<ul style="list-style-type: none"> • The center shall collect and store sensor (traffic, pedestrian, multimodal crossing) fault data and send to the maintenance center for repair. 	Existing
	<ul style="list-style-type: none"> • The center shall collect and store CCTV surveillance system (traffic, pedestrian) fault data send to the maintenance center for repair. 	Existing
	<ul style="list-style-type: none"> • The center shall exchange data with maintenance centers concerning the reporting of faulty equipment and the schedule/status of their repair. Information exchanged includes details of new equipment faults, and clearances when the faults are cleared. 	Existing
	<ul style="list-style-type: none"> • The center shall support an interface with a map update provider, or other appropriate data sources, through which updates of digitized map data can be obtained and used as a background for traffic maintenance data. 	Existing

7. INTERCONNECTS AND ARCHITECTURE FLOWS

While it is important to identify the various systems and stakeholders as part of the Iowa Statewide ITS Architecture, a primary purpose of the Iowa Statewide ITS Architecture is to identify the *connectivity* between systems. Architecture interconnects define an ITS architecture from a physical perspective, which shows the connections that can be established between equipment and systems which may be deployed by different organizational or operating agencies throughout the region. Architecture flows define an ITS architecture from a logical perspective, which identify a high level information exchange associated with each interconnect between equipment and systems.

7.1 System Interconnects

Based on subsystems and market packages that are selected for each ITS inventory element, a set of interconnects between the elements have been identified. As shown in Figure 7-1, a high-level interconnects for the Iowa Statewide ITS Architecture, often referred to as a “sausage diagram,” illustrates the subsystems and primary types of interconnections (or communications) between these subsystems. The sausage diagram was customized to reflect the systems of the Iowa Statewide ITS Architecture. The shaded areas in Figure 7-1 indicate the functions and services that are not currently existing and planned in the state. The sausage diagram identifies three basic types of communications used to interconnect the elements in the Iowa state. The definitions of the three types of communications are:

- **Fixed Point to Fixed Point Communications:** a communication link serving stationary entities. It may be implemented using a variety of public or private communication networks and technologies. It can include, but is not limited to, twisted pair, coaxial cable, fiber optic, microwave relay networks, spread spectrum, etc. In Fixed-Point to Fixed-Point communication the important issue is that it serves stationary entities. Both dedicated and shared communication resources may be used.
- **Wide Area Wireless Communications:** a communications link that provides communications via a wireless device between a user and an infrastructure-based system. Both broadcast (one-way) and interactive (two-way) communications services are grouped into wide-area wireless communications in the National ITS Architecture. These links support a range of services in the National ITS Architecture including real-time traveler information and various forms of fleet communications.
- **Dedicated Short Range Communications:** a wireless communications channel used for close-proximity communications between vehicles and the immediate infrastructure. It supports location-specific communications for ITS capabilities such as toll collection, transit vehicle management, driver information, and automated commercial vehicle operations.

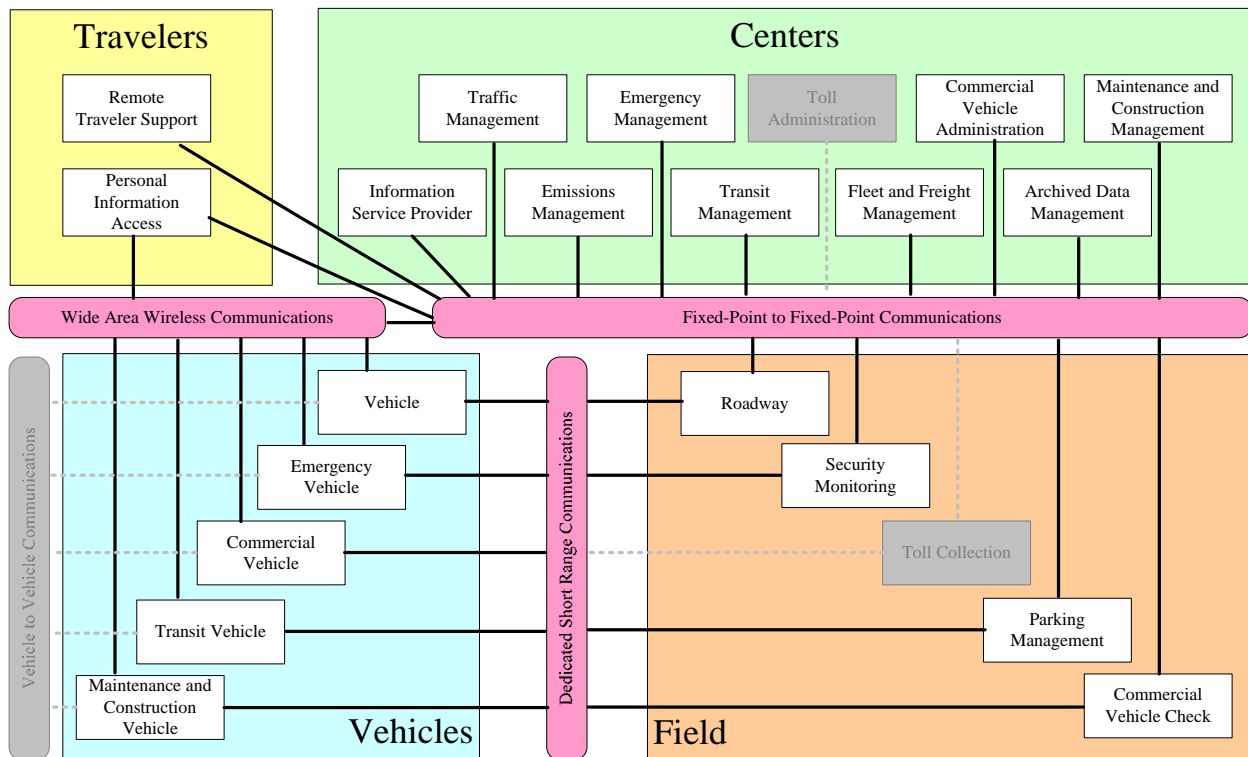


Figure 7-1. Iowa statewide ITS Architecture Sausage Diagram

On a more specific level, interconnect diagrams can depict the interactions between a specific element and other associated agencies and their systems within the architecture. Figure 7-2 illustrates interconnects between the Iowa DOT Central Office and other existing or planned elements. A complete set of the interconnect diagrams for the Iowa Statewide ITS Architecture is included in Appendix C and can also be found in the Turbo Architecture database.

7.2 Architecture Flows

Architecture flows provide a high level description of information exchange associated with each interconnect between equipment and systems. The architecture flows identified in the Iowa Statewide ITS Architecture were derived from the architecture flow diagrams within the National ITS Architecture, and therefore, they are consistent with the National ITS Architecture. Through the architecture flows, stakeholders can easily identify the existing or potential information exchange between agencies and systems. This provides a framework for analyzing how elements are related and thereby to identify the areas for potential coordination and cooperation among agencies. Figure 7-3 illustrates the architecture flow diagram for the Iowa DOT Condition Acquisition and Reporting System (CARS). Detailed definitions of architecture flows can be found at the National ITS Architecture website at <http://www.iteris.com/itsarch/>. A complete list of architecture flows for the Iowa Statewide ITS Architecture is provided in Appendix D, and can be found in the Turbo Architecture database.

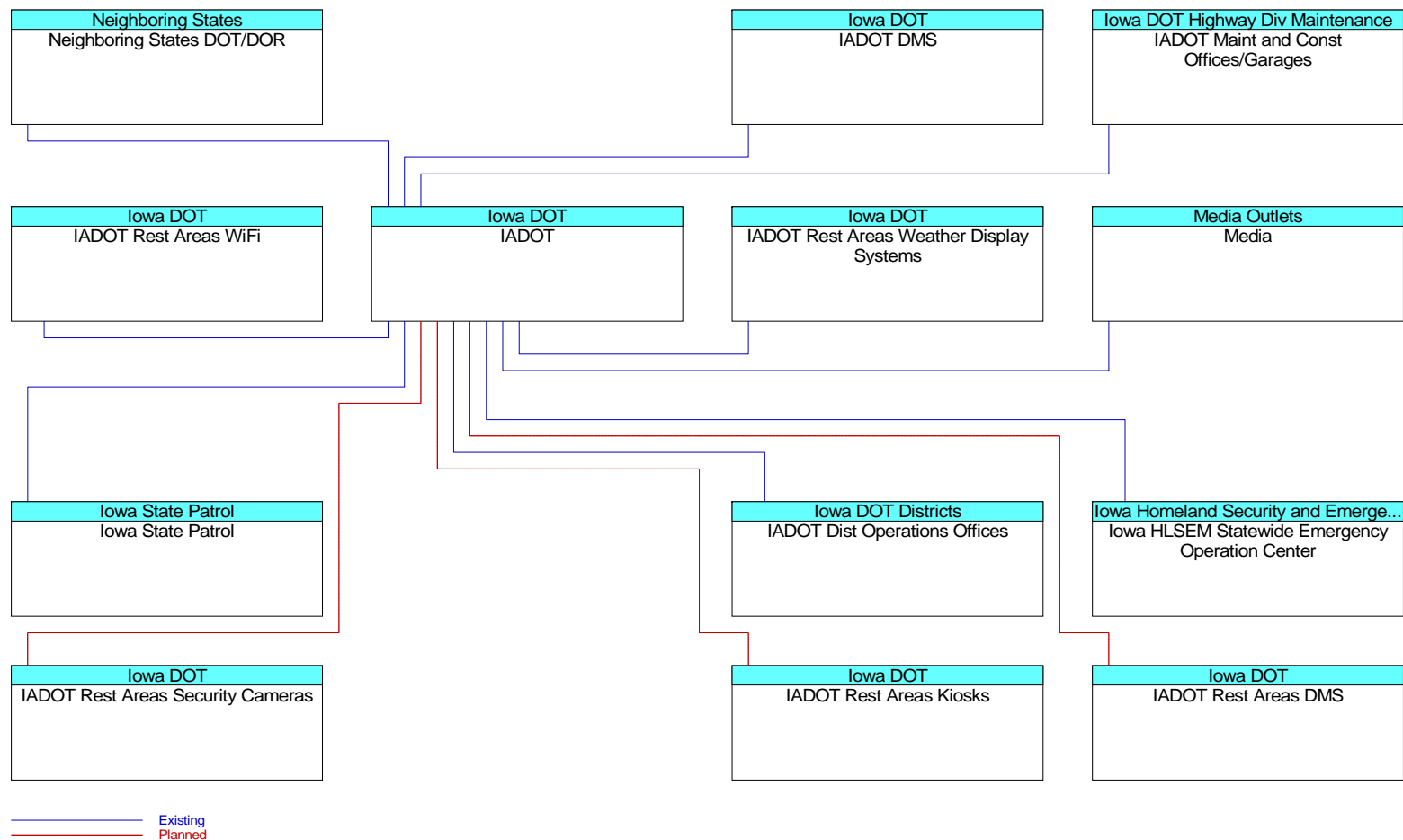


Figure 7-2. Sample Interconnect Diagram: Iowa DOT Central Office

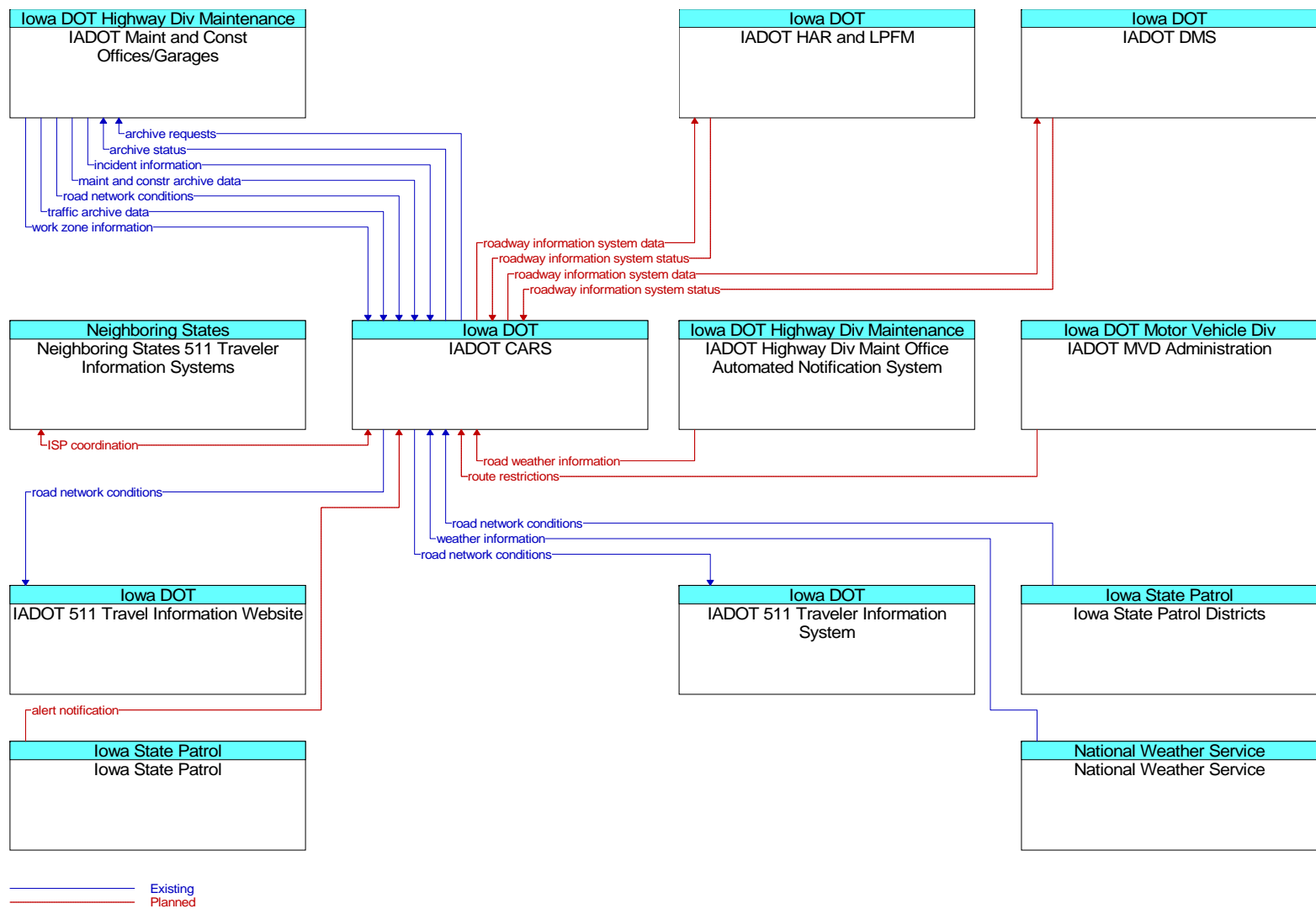


Figure 7-3. Sample Architecture Flow Diagram: Iowa DOT CARS

7.3 High-Level Architectures for Selected Projects

High-level project architectures have been developed for the planned projects in the Iowa Statewide ITS Architecture. The project architectures illustrate the interfaces and interactions between the subsystem/terminators for the planned projects. A list of planned ITS projects has been identified and can be found in Section 9. The following pages present a series of architecture flow diagrams for the selected near-term ITS projects that have been planned to date. These architecture flow diagrams illustrate the interfaces and interactions between the subsystems/terminators for the selected projects.

Iowa DOT CCTV on RWIS Towers

This project will install CCTV cameras on existing Iowa DOT RWIS towers. Cameras will provide images of the roadway to allow DOT maintenance managers to observe the condition of the road and traffic flow. The traveling public will be able to view camera images on the DOT's WeatherView website. Figure 7-4 illustrated the project architecture flow diagram.

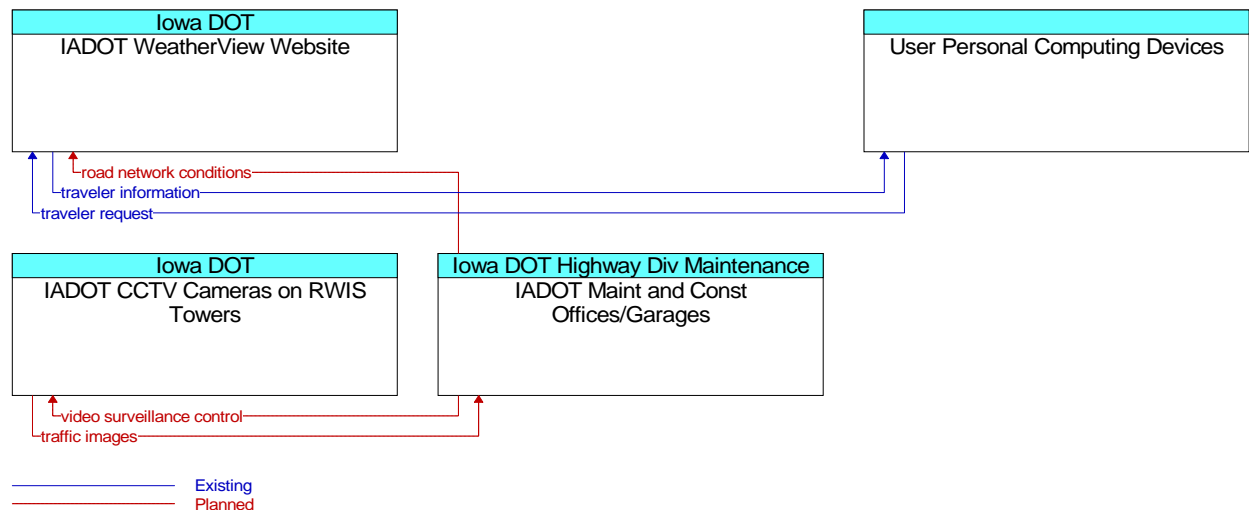


Figure 7-4. Project Architecture: Iowa DOT CCTV on RWIS Towers

Iowa DOT Dynamic Speed Zone Signs

This project will deploy equipment with dynamic signs that detects and displays speeds of vehicles approaching speed zones. A system is planned to deploy near the United Community Schools on US Highway 30. The project architecture flow diagram is illustrated in Figure 7-5.

Iowa DOT Precipitation and Visibility Sensors

This project will update existing RWIS sensors to optical weather identifiers and visibility detectors or other accurate, versatile precipitation identification equipment. Improved precipitation observations will help maintenance managers and forecasters track the path and characteristics of precipitation. Visibility detection performance will be tested to determine if the observations can be used as a guide for road closures. Figure 7-6 provided the architecture flow diagram for this project.

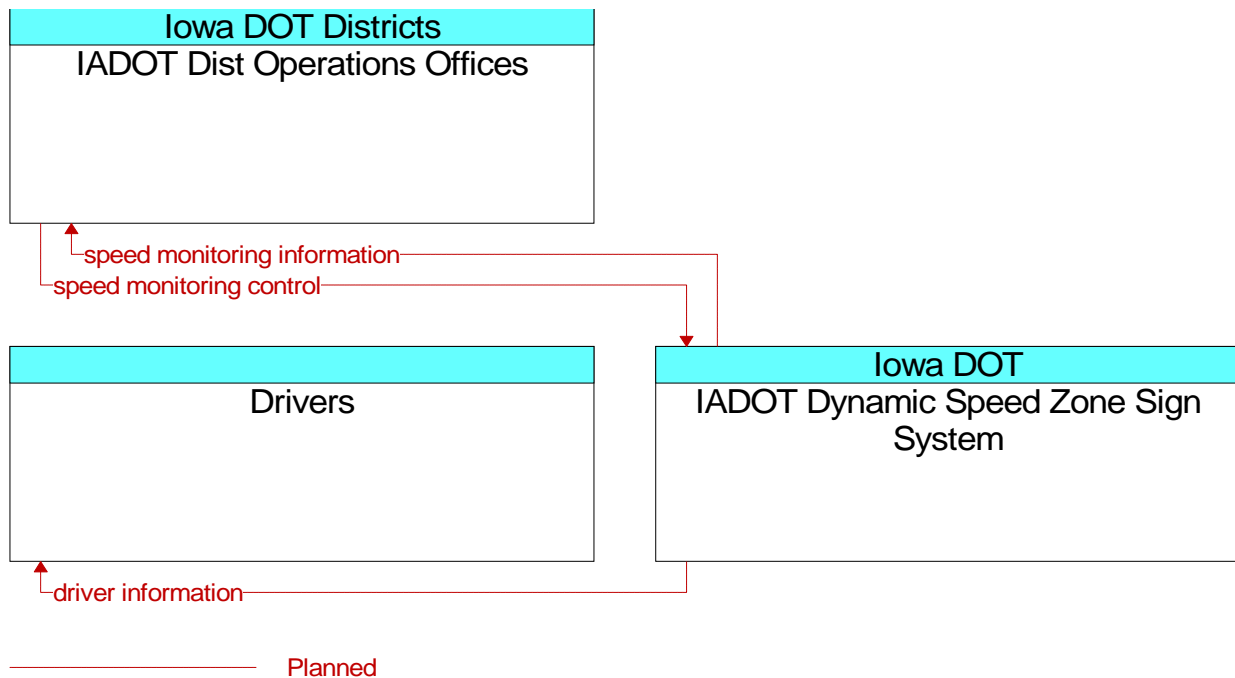


Figure 7-5. Project Architecture: Iowa DOT Dynamic Speed Zone Signs

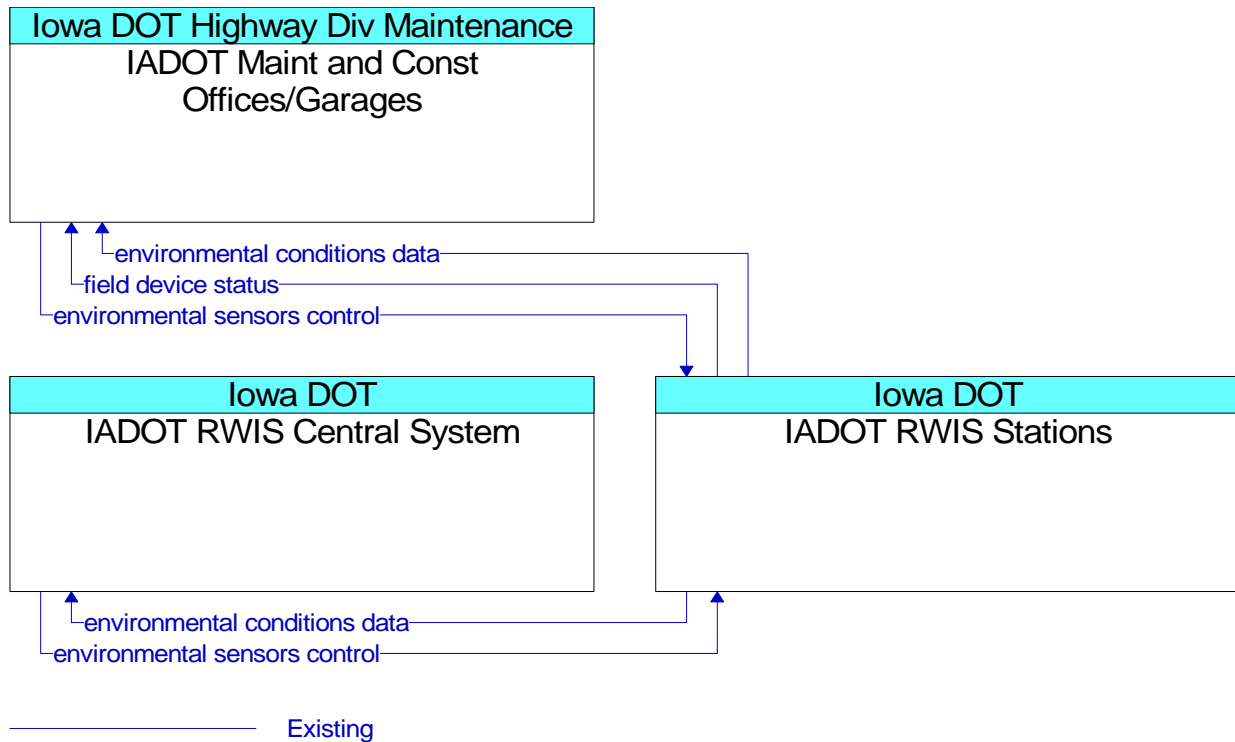


Figure 7-6. Project Architecture: Iowa DOT Precipitation and Visibility Sensors

Iowa DOT Speed Sensors

This project plans to install speed detectors near or at the existing RWIS sites. Speed information can be used to assess winter maintenance performance, the effects of certain weather events on traffic flow, and monitor the current traffic flow for the traveling public. The architecture flow diagram for this project is shown in Figure 7-7.

Iowa DOT Maintenance Drive By Data Download System

A Drive By Data Download System is planned to allow the DOT maintenance supervisors to remotely download the data from maintenance vehicles. The maintenance vehicle will equipment with spreader control to gather data from the sander, pre-wet and anti-ice flow meters. Maintenance supervisors can print out the data for an after storm assessment of how much material was used during the storm. The architecture flow diagram for this project is shown in Figure 7-8.

Regional Transit Authority AVL/GPS

This project will install mobile data terminals and deploy automated vehicle location (AVL)/global positioning system (GPS) technology on several regional transit authorities' transit vehicles. A number of regional transit authorities have already implemented the AVL/GPS technology on their fleets. Regional transit authorities in Regions 1, 2, 3, 8, 9, 10, 11, 13, and 15 plan to install the systems on their fleets. Figure 7-9 illustrates the architecture for the project.

Regional Transit Authority On-board Vehicle Security Cameras

Two regional transit authorities, Region 5 (MIDAS Council of Governments) and Region 8 (Delaware, Dubuque and Jackson County Regional Transit Authority), plan to install security cameras on board of transit vehicles to provide security and safety functions. Figure 7-10 shows the architecture flow diagram for the project.

Iowa DOT Permanent DMS

The project will deploy multiple DMS across the state. 29 locations have been identified for FY2005 to 2008. DMS will be used to provide real-time traffic advisory and route guidance information to road users. This project will also involve multiple stakeholders with sharing the control of DMS and coordinating with information exchange and actions. The detailed architecture flow diagram is illustrated in Figure 7-11.

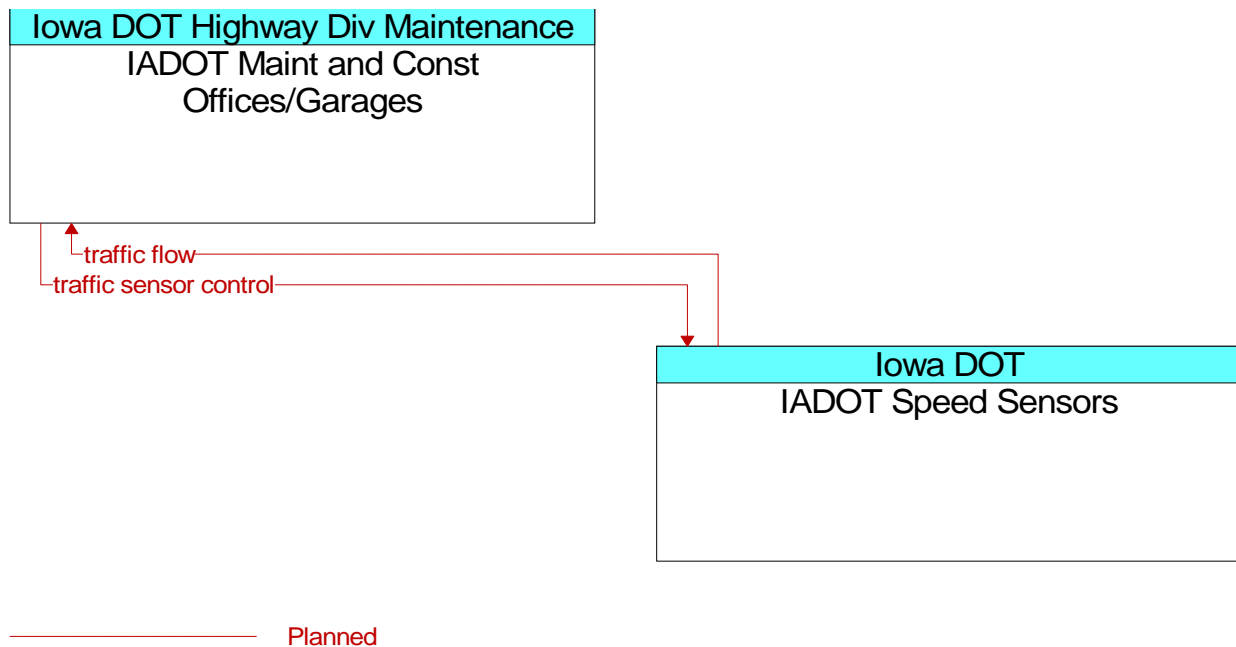


Figure 7-7. Project Architecture: Iowa DOT Speed Sensors

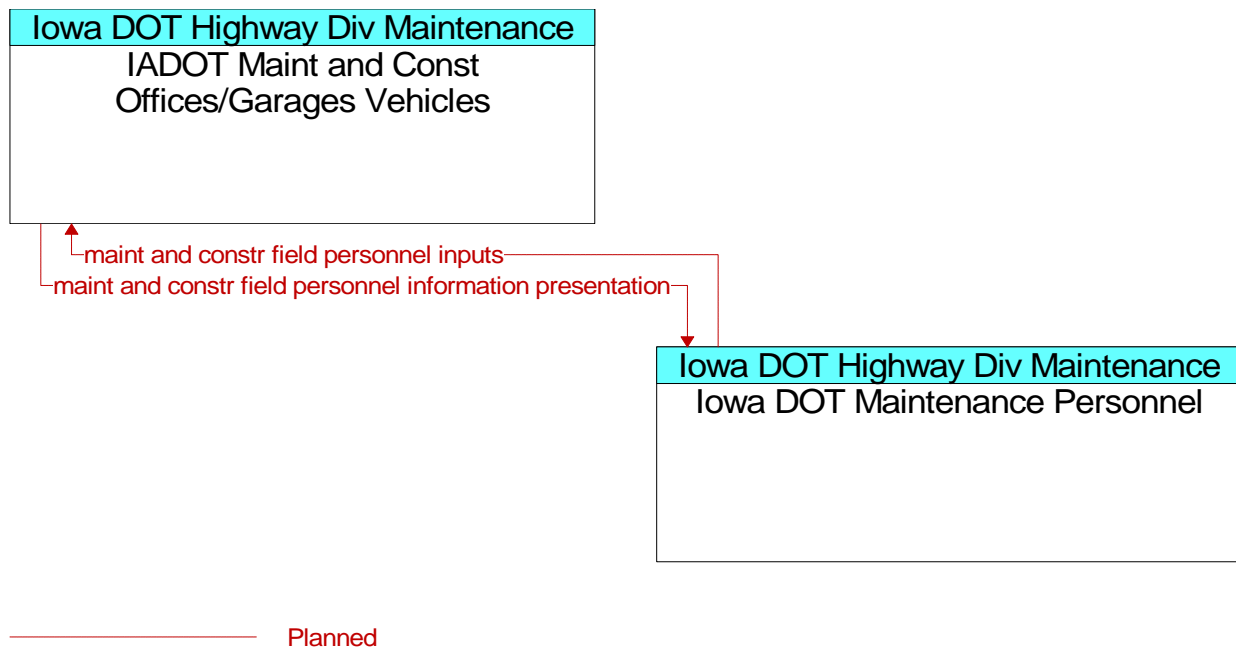


Figure 7-8. Project Architecture: Maintenance Drive By Data Download System

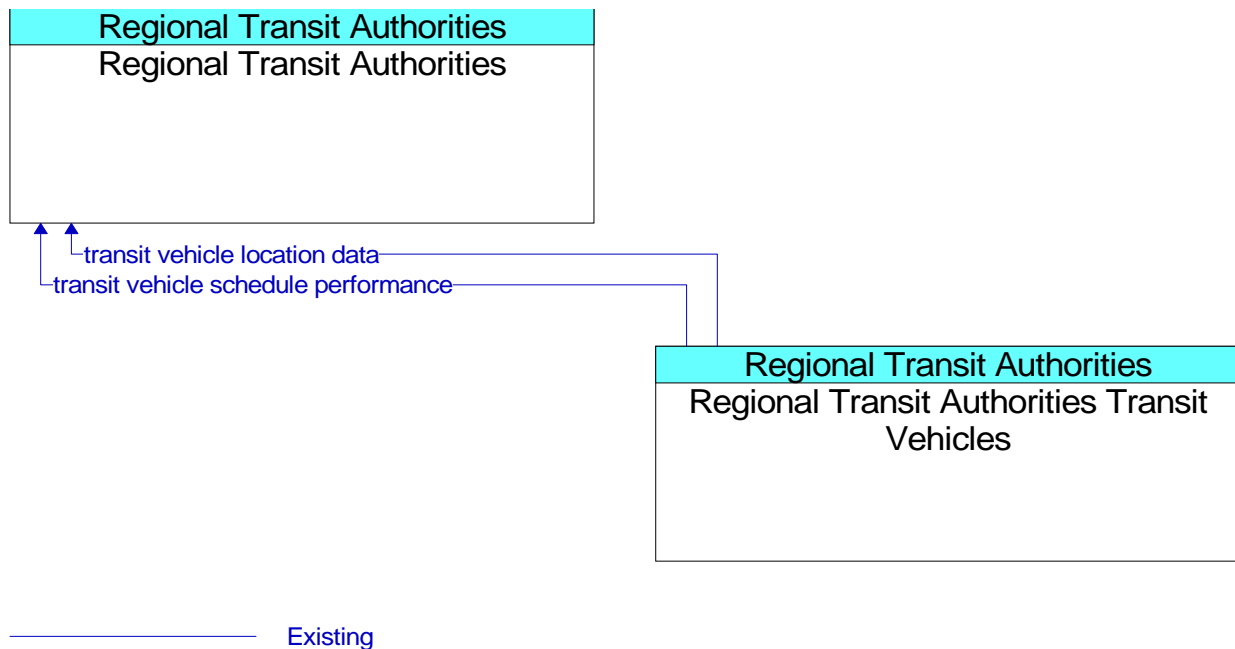


Figure 7-9. Regional Transit Authority AVL/GPS

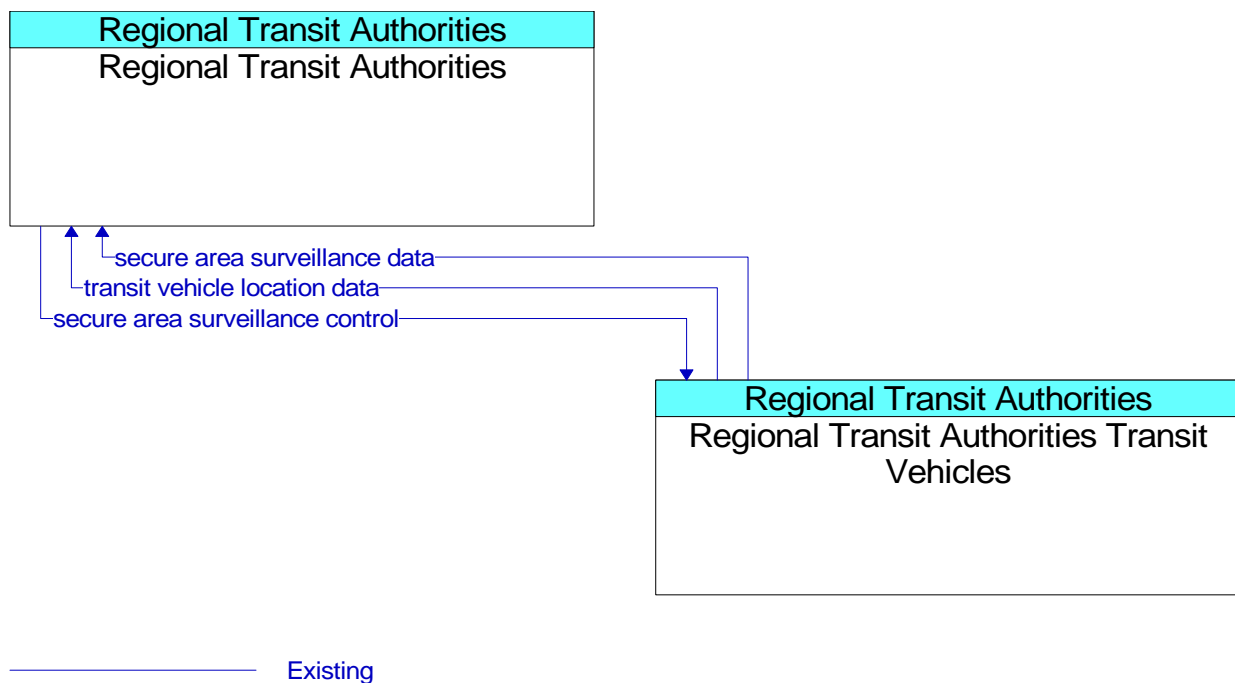


Figure 7-10. Regional Transit Authority On-board Vehicle Security Cameras

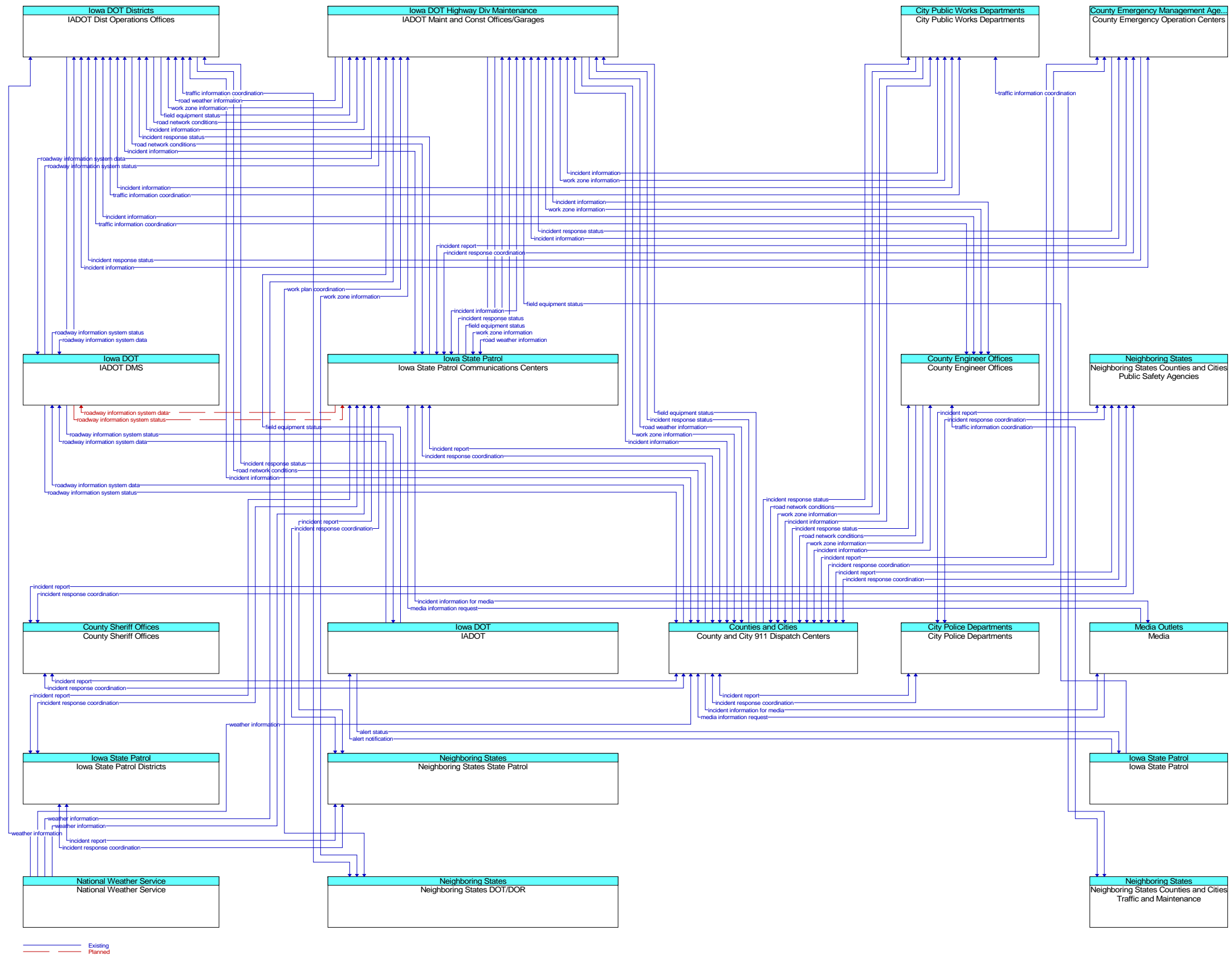


Figure 7-11. Project Architecture: Iowa DOT DMS Project

8. ITS STANDARDS

ITS Standards are fundamental to the establishment of an open ITS environment that achieves the goals originally envisioned by the U.S. Department of Transportation. Standards facilitate deployment of interoperable systems at local, regional, and national levels without impeding innovation as technology advances and new approaches evolve.

Standards can be thought of as the glue that holds the various pieces of architecture together. The logical architecture presents a functional view of the ITS user services. It defines the functions or processes that are required to perform the selected ITS user services, and the information or data flows that need to be exchanged between these functions. The physical architecture partitions the functions defined by the logical architecture into systems and subsystems. To accomplish the functions outlined in the logical architecture, communication must take place between the elements of the physical architecture. Standards define how these communications take place.

8.1 Standards Benefits

Many of the benefits the public receives from the National ITS Architecture are a direct result of the development and implementation of standards. Primarily, standards provide benefits in the following areas:

- **National Compatibility** – National compatibility is represented by the ability to use the same equipment and services, regardless of the geographical location. The architecture identifies specific interfaces requiring nationwide compatibility. Examples include the delivery of real-time traveler information to in-vehicle devices and the dedicated short-range interface between the vehicle and the roadside. Nationwide standards for these types of interfaces will allow travelers and commercial vehicles to use their compliant equipment anywhere within the United States.
- **Multiple Suppliers** – The architecture can encourage competition in the delivery of ITS services through the implementation of standards in areas where a standard is not necessarily required to provide a traveler with seamless operation of his ITS service. These interfaces will benefit from standards in allowing multiple suppliers of equipment and software that will directly connect to other ITS systems.
- **Ranges of Functionality** – The standard packages contain data flows that support several levels of service. For example, the *trip plan* data flow contains a large number of optional data fields. The standards developer is encouraged to maintain the flexibility in the data flow specifications to allow for multiple implementations.
- **Synergy** – As discussed above, the architecture began with a logical architecture that satisfied the identified user services. As a result, there are functions and data flows common to several of the services. These “processes” appear in several higher-level data flows, and because they come from a single source they support synergy and consistency.
- **Risk Reduction** – The architecture reduces risk to public providers, private providers and consumers. For public providers, existence of standards means that equipment purchased one year will be likely to operate with new equipment purchased several years from now. This also means that agencies will not be locked into specific vendors since all vendors

will be able to build to the same standard. For private providers, existence of standards means that they can gather information from multiple sources using well-defined message sets and thereby increase the level of service to their customers. For consumers, products build to a particular standard will allow a user to select their service provider from a number of companies, not just the company with which their equipment happens to be compatible.

Defined standards are fundamental to the establishment of nationally compatible and interoperable ITS deployments. Standards will enable deployment of consistent, non-interfering, reliable systems on local, regional and national levels. Open standards will further benefit the consumer by enhancing competition for the range of products necessary to implement the ITS user services. Larger markets for specific products will reduce production costs through economy of scale. Producers benefit from standards because they assure a wide market over which the product can be sold. As deployment occurs, diverse systems will be developed to address the special needs of urban, suburban and rural environments. Standards must ensure interoperability across these implementations without impeding innovation as technology advances and new approaches evolve.

Well-chosen, well-timed, and broadly accepted standards can provide the following frequently referenced benefits:

- **Interoperability between diverse systems** – This benefit facilitates cost-effective area-wide implementations that ultimately provide enhanced service to the consumer.
- **Preservation of investment** – Timely standards can reduce investments in multiple incompatible approaches, some of which will become casualties of natural selection in the market place.
- **Technology insertion** – Systems can be incrementally improved to take advantage of new technologies.
- **Creation of broader markets** – Interoperability standards set the stage for national and/or international markets. The lack of a standard may ultimately limit the size of the market.
- **Interchangeability** – Interchangeable equipment reduces capital costs through increased competition and reduces maintenance costs through smaller spares inventories of less expensive replacement parts.

Note that the adopted standards must be comprehensive to support interoperability. There are several examples in which hastily developed and adopted standards have not included sufficient specification to guarantee interoperability between standard-compliant systems.

8.2 Recommended Standards for Iowa

More than 110 standards have been identified as part of the National ITS architecture standard development activities. The task of working with public and private sector ITS community to develop these standards has been tasked to seven different standards development organizations (SDOs). These SDOs include:

- American Association of State Highway and Transportation Officials (AASHTO)
- American National Standards Institute (ANSI)
- American Society for Testing and Materials (ASTM)
- Institute of Electrical and Electronics Engineers (IEEE)
- International Organization for Standardization (ISO)
- Institute of Transportation Engineers (ITE)
- National Electrical Manufacturers Association (NEMA)
- Society of Automotive Engineers (SAE)

Information on the complete list of ITS Standards can be found on the ITS Standards webpage at <http://www.standards.its.dot.gov/>.

While the Iowa Statewide ITS Architecture is a comprehensive plan which includes various ITS applications, it does not cover every conceivable ITS technology. As such, not all ITS standards will be applicable to the existing and proposed projects. Table 8-1 summarizes the appropriate ITS standards for all existing and proposed projects in Iowa.

Table 8-1. Key Standards Supporting the ITS Projects in Iowa

No	Standard Name	SDO	Document ID	Status*
1	Simple Transportation Management Framework (STMF)	AASHTO/ITE/ NEMA	NTCIP 1101	P
2	Octet Encoding Rules (OER) Base Protocol	AASHTO/ITE/ NEMA	NTCIP 1102	A
3	Transportation Management Protocols (TMP)	AASHTO/ITE/ NEMA	NTCIP 1103	U
4	Center-to-Center Naming Convention Specification	AASHTO/ITE/ NEMA	NTCIP 1104	U
5	CORBA Security Service Specification	AASHTO/ITE/ NEMA	NTCIP 1105	S
6	CORBA Near-Real Time Data Service Specification	AASHTO/ITE/ NEMA	NTCIP 1106	S
7	Global Object Definitions	AASHTO/ITE/ NEMA	NTCIP 1201	P
8	Object Definitions for Actuated Traffic Signal Controller Units	AASHTO/ITE/ NEMA	NTCIP 1202	P
9	Object Definitions for Dynamic Message Signs (DMS)	AASHTO/ITE/ NEMA	NTCIP 1203	P
10	Environmental Sensor Station (ESS) Interface Standard	AASHTO/ITE/ NEMA	NTCIP 1204	P
11	Object Definitions for Closed Circuit Television (CCTV) Camera Control	AASHTO/ITE/ NEMA	NTCIP 1205	P
12	Object Definitions for Data Collection and Monitoring (DCM) Devices	AASHTO/ITE/ NEMA	NTCIP 1206	A
13	Object Definitions for Ramp Meter Control (RMC) Units	AASHTO/ITE/ NEMA	NTCIP 1207	P
14	Object Definitions for Closed Circuit Television (CCTV) Switching	AASHTO/ITE/ NEMA	NTCIP 1208	A

No	Standard Name	SDO	Document ID	Status*
15	Data Element Definitions for Transportation Sensor Systems (TSS)	AASHTO/ITE/ NEMA	NTCIP 1209	A
16	Field Management Stations - Part 1: Object Definitions for Signal System Masters	AASHTO/ITE/ NEMA	NTCIP 1210	U
17	Object Definitions for Signal Control and Prioritization	AASHTO/ITE/ NEMA	NTCIP 1211	B
18	TCIP Common Public Transportation (CPT) Objects	AASHTO/ITE/ NEMA	NTCIP 1401	P
19	TCIP Incident Management (IM) Objects	AASHTO/ITE/ NEMA	NTCIP 1402	P
20	TCIP Passenger Information (PI) Objects	AASHTO/ITE/ NEMA	NTCIP 1403	P
21	TCIP Scheduling/Runcutting (SCH) Objects	AASHTO/ITE/ NEMA	NTCIP 1404	P
22	TCIP Spatial Representation (SP) Objects	AASHTO/ITE/ NEMA	NTCIP 1405	P
23	TCIP On-Board (OB) Objects	AASHTO/ITE/ NEMA	NTCIP 1406	P
24	TCIP Control Center (CC) Objects	AASHTO/ITE/ NEMA	NTCIP 1407	P
25	TCIP Fare Collection (FC) Business Area Objects	AASHTO/ITE/ NEMA	NTCIP 1408	P
26	Point to Multi-Point Protocol Using RS-232 Subnetwork Profile	AASHTO/ITE/ NEMA	NTCIP 2101	P
27	Point to Multi-Point Protocol Using FSK Modem Subnetwork Profile	AASHTO/ITE/ NEMA	NTCIP 2102	P
28	Point-to-Point Protocol Over RS-232 Subnetwork Profile	AASHTO/ITE/ NEMA	NTCIP 2103	A
29	Ethernet Subnetwork Profile	AASHTO/ITE/ NEMA	NTCIP 2104	A
30	Transportation Transport Profile	AASHTO/ITE/ NEMA	NTCIP 2201	A
31	Internet (TCP/IP and UDP/IP) Transport Profile	AASHTO/ITE/ NEMA	NTCIP 2202	P
32	Simple Transportation Management Framework (STMF) Application Profile	AASHTO/ITE/ NEMA	NTCIP 2301	P
33	Trivial File Transfer Protocol (TFTP) Application Profile	AASHTO/ITE/ NEMA	NTCIP 2302	P
34	File Transfer Protocol (FTP) Application Profile	AASHTO/ITE/ NEMA	NTCIP 2303	P
35	Application Profile for DATEX-ASN (AP-DATEX)	AASHTO/ITE/ NEMA	NTCIP 2304	A
36	Application Profile for CORBA (AP-CORBA)	AASHTO/ITE/ NEMA	NTCIP 2305	S
37	Application Profile for XML Message Encoding and Transport in ITS C2C Communications	AASHTO/ITE/ NEMA	NTCIP 2306	U
38	Information Profile for DATEX	AASHTO/ITE/ NEMA	NTCIP 2501	S
39	Information Profile for CORBA	AASHTO/ITE/ NEMA	NTCIP 2502	S
40	Commercial Vehicle Safety Reports	ANSI	ANSI TS284	P
41	Commercial Vehicle Safety and Credentials Information Exchange	ANSI	ANSI TS285	P

No	Standard Name	SDO	Document ID	Status*
42	Commercial Vehicle Credentials	ANSI	ANSI TS286	P
43	Electronic Filing of Tax Return Data	ANSI	ANSI TS813	P
44	Standard Specification for Dedicated Short Range Communication (DSRC) Physical Layer using Microwave in the 902-928 MHz Band	ASTM	ASTM E2158-01	P
45	Standard Specification for Telecommunications and Information Exchange Between Roadside and Vehicle Systems - 5 GHz Band Dedicated Short Range Communications (DSRC) Medium Access Control (MAC) and Physical Layer (PHY) Specifications	ASTM (IEEE)	ASTM E2213-02 (IEEE 802.11)	P
46	Standard Specification for Metadata to Support Archived Data Management Systems	ASTM	ASTM E2259-xx	U
47	Standard Specification for Archiving ITS Generated Travel Monitoring Data	ASTM	ASTM E2259-yy	U
48	Standard Provisional Specification for Dedicated Short Range Communication (DSRC) Data Link Layer	ASTM	ASTM PS 105-99	S
49	Standard for Common Incident Management Message Sets (IMMS) for use by EMCs	IEEE	IEEE 1512-2000	P
50	Standard for Traffic Incident Management Message Sets for Use by EMCs	IEEE	IEEE 1512.1-2003	P
51	Standard for Public Safety IMMS for use by EMCs	IEEE	IEEE 1512.2-2004	P
52	Standard for Hazardous Material IMMS for use by EMCs	IEEE	IEEE 1512.3-2002	P
53	Standard for Common Traffic Incident Management Message Sets for Use in Entities External to Centers	IEEE	IEEE 1512.4	U
54	Standard for Interface Between the Rail Subsystem and the Highway Subsystem at a Highway Rail Intersection	IEEE	IEEE 1570-2002	P
55	Resource Manager for DSRC 5.9 GHz	IEEE	IEEE 1609.1	U
56	Application Services (Layers 6,7) for DSRC 5.9 GHz	IEEE	IEEE 1609.2	U
57	Communications Services (Layers 4,5) for DSRC 5.9 GHz (Future Standard)	IEEE	IEEE 1609.3	U
58	Medium Access Control (MAC) Extension & the MAC Extension Management Entity for DSRC 5.9 GHz	IEEE	IEEE 1609.4	U
59	Logical Link (Layer 2) for DSRC 5.9 GHz	IEEE	IEEE 802.2	P
60	Standard for Message Sets for Vehicle/Roadside Communications	IEEE	IEEE 1455-1999	P
61	Networking Services (Layer 3) for DSRC 5.9 GHz	ISO	ISO 21210	U
62	Standard for Functional Level Traffic Management Data Dictionary (TMDD)	ITE	ITE TM 1.03	A
63	Message Sets for External TMC Communication (MS/ETMCC)	ITE	ITE TM 2.01	A
64	Location Referencing Message Specification (LRMS)	SAE	SAE J2266	P
65	On-Board Land Vehicle Mayday Reporting Interface	SAE	SAE J2313	P
66	Message Set for Advanced Traveler Information System (ATIS)	SAE	SAE J2354	P
67	Standard for ATIS Message Sets Delivered Over Reduced Bandwidth Media	SAE	SAE J2369	P
68	Messages for Handling Strings and Look-Up Tables in ATIS Standards	SAE	SAE J2540	P
69	RDS (Radio Data System) Phrase Lists	SAE	SAE J2540-1	P
70	ITIS (International Traveler Information Systems) Phrase Lists	SAE	SAE J2540-2	P

No	Standard Name	SDO	Document ID	Status*
71	National Names Phrase List	SAE	SAE J2540-3	P

***Status (as of July 2005):**

P – Published: Standards that are available for purchase.

A – Approved: Standards that have passed all necessary ballots and have been approved by a standards development organization, but not yet published.

B – In Ballot: Standards that are being voted upon by a committee or working group, or are undergoing other SDO procedures.

U – Under Development: Standards that are being written, but are not yet ready for a formal ballot.

S – Standard Development Work has been suspended; or standards have been withdrawn.

8.3 Mapping of Recommended Standards to Application Areas

Table 8-2 provided a guide to the recommended ITS standards that should be considered for use in different types of ITS projects in Iowa. Each row in the table represents an ITS standard and each column represents one of nineteen application areas. The standards included in the table are those that relate to the subsystems and information flows between them that are likely to be included in the ITS projects in Iowa. The application areas are deployment-oriented categories that focus on specific ITS services or systems. Each application area consists of one or more interfaces in the National ITS Architecture. They were chosen so that agencies and service providers can easily find the application area within which a particular ITS project fits. Most ITS projects will relate to only one application area, although larger projects may relate to more than one application area.

Note that not all interfaces in the Iowa Statewide ITS Architecture are represented by an application area. This is because not all interfaces are currently represented by an approved or published ITS standards. Additional application areas may be added in the future as additional ITS standards become available. The inclusion of a standard in an application area indicates that that standard may apply—not that it must apply. On the other hand, the exclusion of a standard from an application area does not mean that the standard may not be used in a project for that application area. For example, traffic management standards do not include traveler information standards; however, traffic management centers may benefit from knowing that traveler information systems do with the information.

One of the ITS standards identified as a key standard supporting the ITS projects in Iowa is not included in the Application Area Matrix. The standard, as indicated in the table below, is mapped to the National ITS Architecture, but is assigned to application areas that are not included in the matrix.

<i>SDO</i>	<i>Doc ID</i>	<i>Standard Name</i>
ANSI	TS284	Commercial Vehicle Safety Reports

Table 8-2. Key ITS Standards Application Area Matrix for Iowa

			Center to Center						Center to Roadside						Center to Vehicle/Traveler			Roadside to Roadside	Roadside to Vehicle		
SDO	Doc ID	Standard Name	Data Archival	Incident Management	Rail Coordination	Traffic Management	Transit Management	Traveler Information	Data Collection/Monitoring	Dynamic Message Signing	Environmental Monitoring	Ramp Metering	Traffic Signaling	Vehicle Sensing	Video Surveillance	Mayday/Site Surveillance	Transit Vehicle Communications	Traveler Information	HRI	Signal Priority	Toll/Fee Collection
AASHTO	1101	Simple Transportation Management Framework (STMF)							●	●	●	●	●	●	●						
AASHTO	1102	Octet Encoding Rules (OER) Base Protocol	●	●	●	●	●	●	●	●	●	●	●	●	●						
AASHTO	1103	Transportation Management Protocols (TMP)							●	●	●	●	●	●	●						
AASHTO	1104	Center-to-Center Naming Convention Specification	●	●	●	●	●	●													
AASHTO	1105	CORBA Security Service Specification	●	●	●	●	●	●													
AASHTO	1106	CORBA Near-Real Time Data Service Specification	●	●	●	●	●	●													
AASHTO	1201	Global Object Definitions							●	●	●	●	●	●	●	●					
AASHTO	1202	Object Definitions for Actuated Traffic Signal Controller Units											●								
AASHTO	1203	Object Definitions for Dynamic Message Signs (DMS)								●											
AASHTO	1204	Environmental Sensor Station (ESS) Interface Standard							●		●										
AASHTO	1205	Object Definitions for Closed Circuit Television (CCTV) Camera Control							●					●	●	●					

			Center to Center						Center to Roadside						Center to Vehicle/Traveler		Roadside to Roadside	Roadside to Vehicle			
SDO	Doc ID	Standard Name	Data Archival	Incident Management	Rail Coordination	Traffic Management	Transit Management	Traveler Information	Data Collection/Monitoring	Dynamic Message Signing	Environmental Monitoring	Ramp Metering	Traffic Signaling	Vehicle Sensing	Video Surveillance	Mayday/Site Surveillance	Transit Vehicle Communications	Traveler Information	HRI	Signal Priority	Toll/Fee Collection
AASHTO	1206	Object Definitions for Data Collection and Monitoring (DCM) Devices							●		●			●							
AASHTO	1207	Object Definitions for Ramp Meter Control (RMC) Units										●									
AASHTO	1208	Object Definitions for Closed Circuit Television (CCTV) Switching							●					●	●	●					
AASHTO	1209	Data Element Definitions for Transportation Sensor Systems (TSS)							●			●	●	●							
AASHTO	1210	Field Management Stations - Part 1: Object Definitions for Signal System Masters				●							●								
AASHTO	1211	Object Definitions for Signal Control and Prioritization																		●	
AASHTO	1401	TCIP Common Public Transportation (CPT) Objects	●	●			●	●									●	●			
AASHTO	1402	TCIP Incident Management (IM) Objects		●			●									●	●				
AASHTO	1403	TCIP Passenger Information (PI) Objects	●				●	●									●	●			
AASHTO	1404	TCIP Scheduling/Runcutting (SCH) Objects					●	●									●	●			
AASHTO	1405	TCIP Spatial Representation (SP) Objects		●			●	●								●	●	●			
AASHTO	1406	TCIP On-Board (OB) Objects	●													●	●				

			Center to Center						Center to Roadside						Center to Vehicle/Traveler		Roadside to Roadside	Roadside to Vehicle			
SDO	Doc ID	Standard Name	Data Archival	Incident Management	Rail Coordination	Traffic Management	Transit Management	Traveler Information	Data Collection/Monitoring	Dynamic Message Signing	Environmental Monitoring	Ramp Metering	Traffic Signaling	Vehicle Sensing	Video Surveillance	Mayday/Site Surveillance	Transit Vehicle Communications	Traveler Information	HRI	Signal Priority	Toll/Fee Collection
AASHTO	1407	TCIP Control Center (CC) Objects	●				●										●				
AASHTO	1408	TCIP Fare Collection (FC) Business Area Objects	●				●										●	●			
AASHTO	2101	Point to Multi-Point Protocol Using RS-232 Subnetwork Profile							●	●	●	●	●	●	●						
AASHTO	2102	Point to Multi-Point Protocol Using FSK Modem Subnetwork Profile							●	●	●	●	●	●	●						
AASHTO	2103	Point-to-Point Protocol Over RS-232 Subnetwork Profile							●	●	●	●	●	●	●						
AASHTO	2104	Ethernet Subnetwork Profile	●	●	●	●	●	●	●	●	●	●	●	●	●						
AASHTO	2201	Transportation Transport Profile							●	●	●	●	●	●	●						
AASHTO	2202	Internet (TCP/IP and UDP/IP) Transport Profile	●	●	●	●	●	●	●	●	●	●	●	●	●						
AASHTO	2301	Simple Transportation Management Framework (STMF) Application Profile							●	●	●	●	●	●	●						
AASHTO	2302	Trivial File Transfer Protocol (TFTP) Application Profile							●		●			●	●						
AASHTO	2303	File Transfer Protocol (FTP) Application Profile	●	●	●	●	●	●	●	●	●			●	●						
AASHTO	2304	Application Profile for DATEX-ASN (AP-DATEX)	●	●	●	●	●	●													
AASHTO	2305	Application Profile for CORBA (AP-CORBA)	●	●	●	●	●	●													

			Center to Center						Center to Roadside						Center to Vehicle/Traveler			Roadside to Roadside	Roadside to Vehicle		
SDO	Doc ID	Standard Name	Data Archival	Incident Management	Rail Coordination	Traffic Management	Transit Management	Traveler Information	Data Collection/Monitoring	Dynamic Message Signing	Environmental Monitoring	Ramp Metering	Traffic Signaling	Vehicle Sensing	Video Surveillance	Mayday/Site Surveillance	Transit Vehicle Communications	Traveler Information	HRI	Signal Priority	Toll/Fee Collection
AASHTO	2306	Application Profile for XML Message Encoding and Transport in ITS C2C Communications	●	●	●	●	●	●													
AASHTO	2501	Information Profile for DATEX	●	●	●	●	●	●													
AASHTO	2502	Information Profile for CORBA	●	●	●	●	●	●													
ANSI	TS285	Commercial Vehicle Safety and Credentials Information Exchange	●																		
ANSI	TS286	Commercial Vehicle Credentials	●																		
ANSI	TS813	Electronic Filing of Tax Return Data																			
ASTM	E2158-01	Standard Specification for Dedicated Short Range Communication (DSRC) Physical Layer using Microwave in the 902-928 MHz Band																		●	●
ASTM	E2213-02	Standard Specification for Telecommunications and Information Exchange Between Roadside and Vehicle Systems - 5 GHz Band Dedicated Short Range Communications (DSRC) Medium Access Control (MAC) and Physical Layer (PHY) Specifications																		●	●

			Center to Center						Center to Roadside						Center to Vehicle/Traveler		Roadside to Roadside	Roadside to Vehicle			
SDO	Doc ID	Standard Name	Data Archival	Incident Management	Rail Coordination	Traffic Management	Transit Management	Traveler Information	Data Collection/Monitoring	Dynamic Message Signing	Environmental Monitoring	Ramp Metering	Traffic Signaling	Vehicle Sensing	Video Surveillance	Mayday/Site Surveillance	Transit Vehicle Communications	Traveler Information	HRI	Signal Priority	Toll/Fee Collection
ASTM	E2259-xx	Standard Specification for Metadata to Support Archived Data Management Systems	●																		
ASTM	E2259-yy	Standard Specification for Archiving ITS Generated Travel Monitoring Data	●																		
ASTM	PS 105-99	Standard Provisional Specification for Dedicated Short Range Communication (DSRC) Data Link Layer																		●	●
IEEE	1512-2000	Standard for Common Incident Management Message Sets (IMMS) for use by EMCs	●	●																	
IEEE	1512.1-2003	Standard for Traffic Incident Management Message Sets for Use by EMCs		●		●															
IEEE	1512.2-2004	Standard for Public Safety IMMS for use by EMCs		●																	
IEEE	1512.3-2002	Standard for Hazardous Material IMMS for use by EMCs		●																	
IEEE	1512.4	Standard for Common Traffic Incident Management Message Sets for Use in Entities External to Centers		●																	
IEEE	1570-2002	Standard for Interface Between the Rail Subsystem and the Highway Subsystem at a Highway Rail Intersection																	●		

			Center to Center						Center to Roadside						Center to Vehicle/Traveler			Roadside to Roadside	Roadside to Vehicle		
			Data Archival	Incident Management	Rail Coordination	Traffic Management	Transit Management	Traveler Information	Data Collection/Monitoring	Dynamic Message Signing	Environmental Monitoring	Ramp Metering	Traffic Signaling	Vehicle Sensing	Video Surveillance	Mayday/Site Surveillance	Transit Vehicle Communications	Traveler Information	HRI	Signal Priority	Toll/Fee Collection
IEEE	1609.1	Resource Manager for DSRC 5.9 GHz																		●	●
IEEE	1609.2	Application Services (Layers 6,7) for DSRC 5.9 GHz																		●	●
IEEE	1609.3	Communications Services (Layers 4,5) for DSRC 5.9 GHz (Future Standard)																		●	●
IEEE	1609.4	Medium Access Control (MAC) Extension & the MAC Extension Management Entity for DSRC 5.9 GHz																		●	●
IEEE	802.2	Logical Link (Layer 2) for DSRC 5.9 GHz																		●	●
IEEE	1455-1999	Standard for Message Sets for Vehicle/Roadside Communications																			●
ISO	21210	Networking Services (Layer 3) for DSRC 5.9 GHz																		●	●
ITE	TM 1.03	Standard for Functional Level Traffic Management Data Dictionary (TMDD)	●	●		●	●	●													
ITE	TM 2.01	Message Sets for External TMC Communication (MS/ETMCC)	●	●		●	●	●													
SAE	J2266	Location Referencing Message Specification (LRMS)															●				
SAE	J2313	On-Board Land Vehicle Mayday Reporting Interface													●						
SAE	J2354	Message Set for Advanced Traveler Information System (ATIS)	●			●	●	●								●	●				

			Center to Center						Center to Roadside						Center to Vehicle/Traveler	Roadside to Roadside	Roadside to Vehicle				
SDO	Doc ID	Standard Name	Data Archival	Incident Management	Rail Coordination	Traffic Management	Transit Management	Traveler Information	Data Collection/Monitoring	Dynamic Message Signing	Environmental Monitoring	Ramp Metering	Traffic Signaling	Vehicle Sensing	Video Surveillance	Mayday/Site Surveillance	Transit Vehicle Communications	Traveler Information	HRI	Signal Priority	Toll/Fee Collection
SAE	J2369	Standard for ATIS Message Sets Delivered Over Reduced Bandwidth Media																●			
SAE	J2540	Messages for Handling Strings and Look-Up Tables in ATIS Standards	●			●	●	●									●	●			
SAE	J2540-1	RDS (Radio Data System) Phrase Lists	●			●	●	●									●	●			
SAE	J2540-2	ITIS (International Traveler Information Systems) Phrase Lists	●			●	●	●									●	●			
SAE	J2540-3	National Names Phrase List	●			●	●	●									●	●			

9. PROJECT SEQUENCING

A project sequence defines the order in which ITS projects should be implemented. A good sequence is based on a combination of two factors:

- **Prioritization of projects based on existing conditions and stakeholder needs.** The regional ITS projects were prioritized to reflect a deployment path (sequence) on stakeholder needs. Although the information collected through stakeholder surveys and meetings was the basis of the regional ITS architecture, technology, funding opportunities and requirements continue to evolve. It is expected that the stakeholders from throughout the region will reevaluate and reprioritize projects frequently.
- **Project dependencies, based on how successive ITS projects can build upon one another.** Project dependencies that influence the project sequencing. It is beneficial to identify the information and functional dependencies between projects based on the regional ITS architecture and any other external dependencies that affect the project sequence.

When possible, ITS system components will be deployed in conjunction with major construction activities along the corridor to minimize cost and disruption to traffic. In some cases, the hardware component will be installed in advance of a fully functional system. An example would be in-pavement loop detectors. The cost of deploying a loop detector during construction is much lower than cutting a loop detector into an existing roadway.

In most cases, the sequence of currently planned projects has already been programmed and can simply be extracted from existing transportation plans. Successive projects will then be added to the sequence based on the project dependencies and other planning factors.

The process for determining the sequence of projects for the Iowa Statewide ITS Architecture includes three steps:

- Review of the Iowa Statewide ITS Architecture and regional ITS architectures,
- Review of relevant planning documents
- Stakeholder feedback

Table 9-1 identifies a list of ITS projects that were planned for deployment in the next 10 years in the state of Iowa. Through the above process, the recommended ITS project sequencing was determined. The list was further refined to establish which projects were allocated to the short term (within 3 years), medium term (4 to 6 years), and long term (over 7 years). This provided a priority for the list of projects denoting a general order for project implementation.

It should be noted, however, that Table 9-1 does not include all planned ITS projects within the state. It mainly consists of projects that may have implications to ITS operations and management at statewide and broader regional levels. The majority of planned ITS projects that have local and regional significance and implications have been included in the regional ITS architectures that have been developed by the MPOs throughout the state. A list of such projects is presented in Table 9-2.

Table 9-1. Planned ITS Projects for Iowa Statewide ITS Architecture

*Note: Timeframe - Short Term: 0-3 years; Medium Term: 4-6 years; Long Term: beyond 6 years.

No.	Project	Description	Timeframe*	Dependency
1	Iowa DOT CCTV Cameras on RWIS Towers	Install cameras on RWIS towers. Cameras can provide images of the roadway used by maintenance managers and the traveling public to observe the condition of the road and traffic flow.	Short	Stand alone. However, the project may be deployed in conjunction with #2.
2	Iowa DOT Precipitation and Visibility Sensors	Update existing yes/no sensors to optical weather identifiers and visibility detectors or other accurate, versatile precipitation identification equipment. Improved precipitation observations will help maintenance managers and forecasters track the path and characteristics of precipitation. Visibility detection performance will be tested to determine if the observations can be used as a guide for road closures.	Short	Stand alone. Also see #1.
3	Iowa DOT Speed Sensors (near or on RWIS sites)	Install speed detectors near or on RWIS sites. Speed information can be used to assess winter maintenance performance, the effects of certain weather events on traffic flow, and monitor the current traffic flow for the traveling public.	Short	Stand alone. However, this project could be deployed in conjunction with #1 and/or #2.
4	Iowa DOT Dynamic Speed Zone Signs	Dynamic signs displaying speeds of vehicles approaching speed zones. It is planned for United Community Schools on Highway 30.	Short	Stand alone.
5	Iowa DOT Permanent DMS	Install DMS across Iowa. 29 locations have been identified for FY2005 to 2008.	Short	Stand alone. Depending on locations, DMS could be deployed in conjunction with #6 and #7.
6	Iowa DOT/Illinois DOT I-74 Bridge/Incident Management Warning System	An integrated ITS system for traffic management and congestion mitigation. It will supply information to the public about the traffic conditions related to area construction and incidents.	Short	Stand alone. Also see #5.

No.	Project	Description	Timeframe*	Dependency
7	Iowa DOT I-80 Incident Management Warning System	An integrated ITS system for traffic management and congestion mitigation. It will supply information to the public about the traffic conditions related to area construction and incidents.	Short	Stand alone. Also see #5.
8	Iowa DOT Railroad Crossing/DMS Information System	Use DMS to alert travelers of approaching trains. A system is planned in the City of Sioux City.	Short	Stand alone.
9	Iowa DOT Rest Area DMS	Interior, miniature DMS will be installed at rest areas and welcome centers across Iowa. AMBER Alert information will be posted on these signs and will refer visitors to the kiosks below the signs. When the signs are not being used for AMBER Alerts, time/temp will be displayed as well as road construction/condition information.	Short	Stand alone.
10	Iowa DOT WeatherView Enhancements	(1) Update Weatherview to accommodate the addition of new information sources and new forecast formats. Camera information can be used in conjunction with other road weather information to determine if the weather seems to be affecting traffic flow. Update DOTnet to accommodate new forecast information and forecasts. Develop automated AWOS and RWIS quality control. (2) Convert AWOS data into METAR format for delivery to the FAA NADIN system, provide cell phone and in-vehicle weather information data feeds, and develop a password protected system that will be used by IADOT supervisors to access sensor condition data from the internet. (3) Create a cell-phone or email subscription system that can notify a subscriber about important weather events or forecasts. Notification conditions can be set by the subscriber and be based on RWIS/AWOS information or forecasts.	Short	Stand alone. Project implementation could be in concert with #2.

No.	Project	Description	Timeframe*	Dependency
11	Iowa DOT Maintenance Drive By Data Download System	Drive By Data Download System is planned to allow the spreader control to gather data from the sander, pre-wet and anti-ice flow meters utilizing GPS/AVL technology, and allow the supervisor to download the data and print out a after storm assessment of how much material was used during the storm.	Short	Stand alone.
12	Iowa DOT Automated Notification System	Install necessary computer or server equipment to support the automatic cell phone or email notification systems. The system allows a maintenance supervisor to post current weather and pavement conditions. The information can be shared with neighboring supervisors and used for public maintenance activity notification systems.	Short/Medium	Stand alone.
13	Iowa DOT CARS Enhancement	Development and enhancements to the CARS main system and subsets like CARS-DMS, CARS-LPFM, CARS-511 etc. CARS: focus is on winter road condition information and summer activities that impact the traveling public. Other enhancements include route permits for over dimensional vehicles; and information on embargoes, detours and incidents. CARS-DMS: CARS information disseminated to travelers by DMS, including travel time. CARS-LPFM: CARS information disseminated to travelers by LPFM CARS-511: CARS information disseminated to travelers by 511 system. Integrating CARS with neighboring 511 traveler information systems.	Short/Medium	Stand alone.
14	Iowa DOT Laser Road Surface Sensors	LRSS cameras can detect ice, snow, moisture, and slush on surfaces and produce color-enhanced images of two lanes of road. LRSS cameras will be installed on RWIS towers in high traffic or trouble-areas to provide detailed road condition information.	Short/Medium	Stand alone.

No.	Project	Description	Timeframe*	Dependency
15	Iowa DOT Maintenance and Construction Vehicles AVL/GPS	Install AVL/GPS capability on additional plows to aid the tracking of maintenance actions and data ingestion into maintenance decision support systems. Also make information available for online viewing.	Short/Medium	Stand alone.
16	Iowa DOT Smart Work Zone Systems	Use DMS, speed monitoring, or other equipment to manage work zone activities.	Short/Medium	Stand alone.
17	Iowa DOT Urban ITS Projects	Enhance the roadway system in urban areas. Projects include: (1) Cameras and Fiber Optic Project in Council Bluffs (FY2006) - install 5 cameras along city of Council Bluffs streets. 2 of these 5 cameras will be at the interchange with I-29/80. These cameras will assist in incident management. Fiber optic cables will be installed between the Council Bluffs maintenance department and the Pottawattamie County 911 dispatch and the DOT's Downtown office. This system will be used as a part of the much larger ITS being built in future years (FY2006); (2) Vehicle Detection/Classification Improvements Project in Sioux City (medium term) - deploy detector stations to collect traffic volume, speed and vehicle classification; (3) Overheight Detection and Warning System in Sioux City (medium term) - install a system to detect and alert drivers of overheight vehicles of upcoming height restricted bridges/overpasses; (4) Slippery Condition Warning System in Sioux City (medium term) - detect roadway conditions and provide a suitable warning to travelers to improve the safety of icing-prone roadways.	Short/Medium	Stand alone.

No.	Project	Description	Timeframe*	Dependency
18	Large Urban Transit Agencies AVL/GPS	City of Bettendorf Transit, Metropolitan Transit Authority of Black Hawk County, Iowa City Transit, City of Coralville Transit, University of Iowa CamBus and City of Ames CyRide, plan to install AVL/GPS system to track transit vehicle locations. Des Moines Metropolitan Transit Authority plan to upgrade its existing AVL/GPS system. Support for other agencies to use the transit AVL/GPS may be included.	Short/Medium/Long	Stand alone.
19	Large Urban Transit Agencies Transit Vehicle On-board Security Cameras	The following agencies plan to install security cameras on-board of transit vehicles: Des Moines Metropolitan Transit Authority, Sioux City Transit, Metropolitan Transit Authority of Black Hawk County, Iowa City Transit, City of Coralville Transit, University of Iowa CamBus, and City of Ames CyRide.	Short/Medium	Stand alone.
20	Regional Transit RouteMatch Software	RouteMatch Software is planned to support schedule, dispatch operations, and other transit management activities in Regions 1, 3 and 5 - 16.	Short/Medium	Could be deployed with #21.
21	Regional Transit Authorities AVL/GPS	Installation of Mobile Data Terminals (MDT) and AVL/GPS equipment. Such systems are planned in Regions 1-3, 5, 6, 8-10, and 13-16.	Short/Medium	Could be combined with #20.
22	Regional Transit Authorities Transit Vehicle On-board Security Cameras	Regions 2, 5, 8, 11, and 13 plan to install transit vehicle on-board security cameras.	Short/Medium	Stand alone.
23	Small Urban Transit Agencies AVL/GPS	City of Clinton Municipal Transit Administration, City of Fort Dodge DART and City of Ottumwa Transit, plan to install AVL/GPS system to track transit vehicle locations.	Short/Medium	Stand alone.
24	Small Urban Transit Agencies Transit Vehicle On-board Security Cameras	City of Clinton Municipal Transit Administration, City of Mason City Transit, and City of Fort Dodge DART, plan to install transit vehicle on-board security cameras.	Short/Medium	Stand alone.

No.	Project	Description	Timeframe*	Dependency
25	Iowa DOT Automatic Gate Closure Systems	Automatic gates are planned to be installed on interstate on-ramps to automatically close the road. The gates would be phoned to activate. The gates would be equipped with flashing lights and be partnered with advance-warning signs that activate when the gates are triggered. Possible technology advancements may include activation through visibility sensor observations. The system is planned on Highway 20 to control access to City of Mason and City of Ames.	Medium	Stand alone.
26	Iowa DOT Rest Area Kiosks	Kiosks at rest areas provide limited information about highway and weather conditions, local hotels, restaurants and tourist attractions. The new kiosk systems are taking a live link from the Wi-Fi system to provide an Internet feed to the kiosks.	Medium	Stand alone.
27	Nebraska DOR/Iowa DOT District Operations Software and Systems	Installation of Operations Software in Iowa DOT District Office that controls roadside equipment, monitor MCO vehicles and updates traveler information systems to support district activities. These systems and devices are utilized to advise the traveling public of roadway events, and supports safety management. This project also includes installation of a Freeway Management software module to support monitoring and managing traffic flow and congestion on roadway systems in the MAPA region. This module supports traffic and event management activities.	Medium	Stand alone.
28	Iowa DOT Advanced Technology Maintenance Vehicles	The advanced technology maintenance vehicles are equipped with selected technologies on pavement surface snow and ice control (plowing and de-icing), fleet utilization (AVL and communication), on-vehicle materials management (combing roadway surface information with onboard inventory system), and equipment management (onboard engine diagnostics).	Medium/Long	Stand alone.

No.	Project	Description	Timeframe*	Dependency
29	Iowa DOT Rest Area Security Cameras	Security cameras installed to monitor rest areas.	Medium/Long	Depending on technology, may use same communication infrastructure as #9.
30	Iowa DOT Winter Maintenance Decision Support System	Forecast weather and road conditions and applied computerized criteria to the data to determine best road treatments, including timing of initial and subsequent treatments, type of treatments, and amounts of chemicals.	Medium/Long	Stand alone.
31	Large Urban Transit Agencies Bus Signal Priority	Des Moines Metropolitan Transit Authority and City of Ames CyRide plan to install bus signal priority system.	Medium/Long	Stand alone.
32	Large Urban Transit Agencies Bus Stop Traveler Information	Electronic displays/audio at bus stops and/or kiosks used to disseminate real-time transit information. City of Ames CyRide plans to provide this functionality.	Medium/Long	Implementation of #18 will provide real-time transit location information to this project.
33	Large Urban Transit Agencies Electronic Payment Systems	Des Moines Metropolitan Transit Authority, City of Dubuque Keyline, and Black Hawk County Metropolitan Transit Authority, plan to install electronic payment systems. Des Moines Metropolitan Transit Authority and University of Iowa CamBus also plan to install automatic ridership counting equipment.	Medium/Long	Stand alone.
34	Large Urban Transit Agencies Transit Vehicle On-board Traveler Information	Transit vehicle on-board equipment to disseminate transit information to riders. City of Bettendorf Transit and City of Coralville Transit plan to install.	Medium/Long	Implementation of #18 will provide real-time transit location information to this project.
35	Large Urban Transit Agencies Transit Websites	Websites to provide real-time or tailored transit information such as trip planning. City of Bettendorf Transit, City of Dubuque Keyline, University of Iowa CamBus and City of Ames CyRide plan to provide this functionality.	Medium/Long	Implementation of #18 will provide real-time transit location information to this project.
36	Regional Transit Authorities Electronic Payment Systems	Regions 2, 5, 8, 11 and 12 plan to install electronic payment systems.	Medium/Long	Stand alone.

No.	Project	Description	Timeframe*	Dependency
37	Regional Transit Authorities Security Monitoring Systems	Regions 2 and 9 plan to use security cameras to monitor transit yards, and Region 2 also plans to use security cameras to monitor bus stops.	Medium/Long	Stand alone.
38	Regional Transit Authorities Transit Vehicle On-board Traveler Information	Transit vehicle on-board equipment to disseminate transit information to riders. Regions 9 and 12 plan to install.	Medium/Long	Implementation of #20 and #21 will provide real-time transit information to this project.
39	Small Urban Transit Agencies Bus Signal Priority	City of Clinton Municipal Transit Administration plans to install bus signal priority system.	Medium/Long	Stand alone.
40	Small Urban Transit Agencies Bus Stop Traveler Information	Electronic displays/audio at bus stops and/or kiosks used to disseminate real-time transit information. City of Clinton Municipal Transit Administration plans to install.	Medium/Long	Implementation of #23 will provide real-time transit location information to this project.
41	Small Urban Transit Agencies Electronic Payment Systems	City of Clinton Municipal Transit Administration and City of Fort Dodge DART, plan to install electronic payment systems.	Medium/Long	Stand alone
42	Regional Transit Authorities Bus Signal Priority	Region 11 plans to have bus signal priority capabilities at Des Moines metro area.	Medium/Long	Stand alone.
43	Small Urban Transit Agencies Security Monitoring Systems	City of Clinton Municipal Transit Administration plans to install security cameras to monitor transit yards and bus stops.	Medium/Long	Stand alone.
44	Small Urban Transit Agencies Transit Vehicle On-board Traveler Information	Transit vehicle on-board equipment to disseminate transit information to riders. City of Clinton Municipal Transit Administration plans to install.	Medium/Long	Implementation of #23 will provide real-time transit information to this project.

Table 9-2. Planned ITS Projects at Local and Regional Levels

Project	Description	Timeframe*
City of Des Moines Parking Management System	Downtown parking management/wayfinding system will use static and dynamic signing to inform drivers of downtown parking conditions and assist drivers in getting to their parking ramps. This system will be connected to the planned city transportation management center.	Short
City Police Red Light Running Systems	Using wireless video technology to record the time, date, vehicle speed, and amount of time the light was red when a car speeds through a red light. The data are physically collected at the site or electronically transmitted to a ticket distribution. Based on the image, police officers determines whether a violation has taken place and a citation will be placed. The systems are planned to be installed in City of Council Bluffs, City of Sioux City, City of Davenport, City of Bettendorf, City of Iowa City, and City of Coralville.	Short
County and City Communications Centers Consolidation/Upgrade	(1). Story County Sheriff, City of Ames Police and Iowa State Police University Consolidated 911 Computer Aided Dispatch: Consolidate emergency communications activities between three 911 communications centers of Story County Sheriff, City of Ames Police, and Iowa State University Police. Three phases/components are proposed: (a) Communications Center Shared CAD and Data Network: the network allows three communications center to seamlessly access each other's record information; (b) Mapping System: the system displays the locations of emergency calls on a city/county map. The system will install telephone switch hardware to accept location information from cellular calls, and software modules to display incidents and calls on the city/county map in the consolidated Computer Aided Dispatch and Crime Records systems; and (c) Mobile Data Terminals for Emergency Vehicles: the system provides field access to sheriff/police records, state and federal databases and direct connections to computer aided dispatch information for emergency vehicles. The system will be built on the current core technologies in the communications centers and the TraCS system currently operating in the patrol vehicles. (2) Johnson County Sheriff and Iowa City Police Joint Communications Center: Joint communications center and mobile display with mapping; (3) Dubuque County 911 Center: 800 MHZ radio system will be evaluated and updated; (4) City of Manchester Police Communications Center: upgrade communications center consoles.	Short/ Medium
City of Des Moines Signal Coordination	The City of Des Moines is developing a plan to coordinate the downtown signals which will be connected to the planned city transportation management center. Des Moines Metropolitan Transit Authority is also working with the City of Des Moines to include signal prioritization for their vehicles. Emergency Agencies are working to further incorporate signal preemption for their vehicles.	Short/ Medium

Project	Description	Timeframe*
City Traffic Signal Systems Upgrade	City of Dubuque: city wide fiber network - install fiber optic conduit along all new streets and intersection interconnect; City of Waterloo: Install/upgrade signal communication infrastructure. City of Sioux City: Install/upgrade traffic signal controllers as well as video detection, and intersection interconnect	Short/ Medium
County and City Emergency Vehicle Preemption	City of Dubuque Fire and Dubuque County Sheriff: EVP planned on emergency vehicles; City of Sioux City: EVP sensors planned at signalized intersections along several corridors. City of Coralville: EVP sensors planned at signalized intersections as well as emergency vehicles.	Short/ Medium
City of Ames RWIS	RWIS are planned along major city roadways to monitor road weather conditions, including bridge and pavement surface temperature, air temperature, wind speeds and direction, humidity, etc.	Medium/ Long
County and City Emergency Vehicles AVL	Delaware County Sheriff, Dubuque County Sheriff, Waterloo Fire, Iowa City Police and Iowa City Fire plan to install AVL to track emergency vehicle locations.	Medium/ Long
County and City Maintenance and Construction Vehicles AVL	Install AVL system to track vehicle locations. Clinton County, Delaware County, Johnson County, City of Cedar Rapids, City of Ames, and City of Evansdale plan to provide this capability.	Medium/ Long
City of Bettendorf DMS	DMS planned on US 67.	Long

10. AGREEMENTS

The Iowa Statewide ITS Architecture provides both a technical and institutional framework for the deployment of ITS in the state of Iowa. Institutional integration involves cooperation and coordination between various agencies and jurisdictions to achieve seamless operations and interoperability.

The previous sections of the report identified the stakeholder roles and responsibilities, key market packages, and ITS deployment activities that would require establishment of an electronic link between and among organizations. From an institutional integration perspective, these electronic links or interfaces will require the establishment of some form of agreement to define roles and responsibilities of each party.

There are several types of arrangements associated with the interfaces identified in the Iowa Statewide ITS Architecture. Information sharing and exchanges between systems require agreements on the transmission protocol and data formats to ensure compatibility. Coordinating field device operations owned by different agencies requires defined procedures for submitting message requests and rules governing when such requests can be honored. Such coordination can be done with informal arrangements such as a Memorandum of Understanding (MOU). Sharing control of field devices operated by different agencies involves more liability issues, which requires more formal agreements. Coordinated incident response may also require formal agreements, but also requires group training of personnel from various agencies. While all interfaces involve agreements for data compatibility, agreements for procedure, operation, and maintenance as well as training can also be critical elements to optimizing the benefits of the architecture.

There is considerable variation between ITS projects and among stakeholders regarding the types of agreements that are created to support ITS integration. Some common types of agreements provided are listed in Table 10-1. The agreement process may begin with something as simple as a handshake agreement. But, once interconnections and integration of systems begin, agencies may want to have something more substantial in place. A documented agreement will aid agencies in planning their operational costs, understanding their respective roles and responsibilities and build trust for future projects. Formal agreements are necessary where funding or financial arrangements are defined or participation in large regionally significant projects is required.

Table 10-2 presents a list of existing and potential agreements that would be required for the implementation and operations of an integrated ITS system in the state of Iowa.

Table 10-1. Types of Agreements

Type of Agreement	Description
Handshake Agreement	<ul style="list-style-type: none"> ▪ Early agreement between one or more partners ▪ Not recommended for long term operations.
Memorandum of Understanding (MOU)	<ul style="list-style-type: none"> ▪ Initial agreement used to provide minimal detail and usually demonstrating a general consensus. ▪ Used to expand a more detailed agreement like an Interagency Agreement that may be broad in scope but contains all of the standard contract clauses required by a specific agency. ▪ May serve as a means to modify a much broader Master Funding Agreement, allowing the master agreement to cover various ITS projects throughout the region and the MOUs to specify the scope and differences between the projects.
Interagency Agreement	<ul style="list-style-type: none"> ▪ Between public agencies (i.e., transit authorities, cities, counties, etc.) for operations, services or funding ▪ Documents responsibility, functions and liability at a minimum.
Intergovernmental Agreement	<ul style="list-style-type: none"> ▪ Between governmental agencies (i.e., Agreements between universities and State DOT, MPOs and State DOT, etc.)
Operational Agreement	<ul style="list-style-type: none"> ▪ Between any agency involved in funding, operating, maintaining or using the right of way of another public or private agency. ▪ Identifies respective responsibilities for all activities associated with shared systems being operated and / or maintained.
Funding Agreement	<ul style="list-style-type: none"> ▪ Documents the funding arrangements for ITS projects (and other projects) ▪ Includes at a minimum standard funding clauses, detailed scope, services to be performed, detailed project budgets, etc.
Master Agreements	<ul style="list-style-type: none"> ▪ Standard contract and / or legal verbiage for a specific agency and serving as a master agreement by which all business is done. These agreements can be found in the legal department of many public agencies. ▪ Allows states, cities, transit agencies and other public agencies that do business with the same agencies over and over (i.e., cities and counties) to have one Master Agreement that uses smaller agreements (i.e., MOUs, Scope of Work and Budget Modifications, Funding Agreements, Project Agreements, etc.) to modify or expand the boundaries of the larger agreement to include more specific language.

Table 10-2. Iowa Statewide ITS Architecture Existing/Potential Agreements

Agreement	Description	Associated Stakeholder
Inter-State AMBER Alert Agreement	Address AMBER Alert plan operational issues across state borders	State DOTs/DOR, State Patrols
Inter-State Data Sharing Agreement	Formal agreements are required to cover the exchange of information between state DOTs/DOR. The data may include 511 traveler information, road conditions, traffic flow, etc.	State DOTs/DOR
Inter-State Operations Agreement	Address system integration, equipment operation coordination, equipment maintenance, operational information exchanging and other issues across state borders. Equipment may include CCTV, DMS, etc.	State DOTs/DOR, County and City Traffic Management Agencies
Inter-State Incident Response Coordination Agreement	Support incident information notification, incident response coordination, resource coordination, etc. among multiple agencies across state borders.	State DOTs/DOR, State Patrols, County and City Public Safety Agencies, County and City Traffic Management and Maintenance Agencies, other agencies
Inter-Agency Data Archiving Agreement	Movement toward an automated system of archiving data sourced from multiple agencies requires the development of agreements on the format, access and use of the information.	Agencies involved into data archiving systems
Inter-Agency Data Sharing Agreement	Formal agreements are required to cover the exchange of data between different agencies in different regions. However, informally, the exchange of information may occur on an as-needed basis. Data may include traffic flow, video images, road weather, road conditions, etc.	Iowa DOT, Iowa State Patrol, County and City Traffic Management Agencies, County and City Public Safety Agencies, Media Outlets, Private Information Service Providers
Inter-Agency Operations Agreement	Address equipment operation coordination, equipment maintenance, operational information exchange and other issues. Equipment may include traffic signal systems, DMS, CCTV, etc.	Iowa DOT, Iowa State Patrol, County and City Traffic Management Agencies, County and City Public Safety Agencies
Multi-Agency Communication Infrastructure Sharing Agreement	There are multiple examples and opportunities for the sharing of communications infrastructure throughout the regions. A regional plan and subsequent agreements that define responsibilities could result in the communications network required to link the various ITS applications together.	Iowa DOT, County and City
Inter-Agency Road Maintenance/Snow Removal Agreement	Define roles and responsibilities for roadway maintenance as well as snow removal.	Iowa DOT, County and City Maintenance Agencies

Agreement	Description	Associated Stakeholder
Multi-Agency EMS Communications Integration Agreement	Integrated EMS communications allows for quickly sharing of current incident response status between allied response agencies and creates a flow of information that reduces or eliminates delay due to a lag in communications.	County and City Public Safety Agencies
Multi-Agency Incident Response Coordination Agreement	Support incident information exchange, incident response coordination, resource coordination, etc. among multiple agencies in different regions.	Iowa DOT, Iowa State Patrol, County and City Public Safety Agencies, County and City Traffic Management and Maintenance Agencies, other agencies
Multi-Agency Disaster Response Coordination Agreement	Define roles, responsibilities, and functions for disaster response, recovery and evacuation and reentry management.	Iowa Public Safety Division, Iowa DOT, Iowa State Patrol, County and City Public Safety Agencies, County and City Traffic Management and Maintenance Agencies, Transit Agencies, other agencies
Multi-Agency Disaster Information Coordination Agreement	Define roles, responsibilities and functions for accessing and disseminating disaster information.	Iowa Public Safety Division, Iowa State Patrol, County and City Public Safety Agencies
Multi-Agency Limited Liability Agreements	Agreements will be developed to address the varying levels of liability limitation associated with the various agencies that would need to work together to enable coordinated, multi-agency transportation and emergency management strategies.	Agencies involved into transportation and emergency management.
Transit Electronic Payment Agreement	Support transit electronic payment systems. Agreements may define roles and responsibilities of transit agencies and financial institution to share information such as revenue from smart cards, etc.	Transit Agencies, Financial Institutions
Transit Bus Signal Priority Agreement	Allow transit vehicles to activate signal priority at signalized intersections.	Transit Agencies, County and City Traffic Management Agencies
Emergency Vehicle Signal Preemption Agreement	Define roles, responsibilities and functions for emergency vehicle preemption at signalized intersections	County and City Public Safety Agencies, County and City Traffic Management Agencies
Railroad Crossing Management Agreement	Define roles, responsibilities and functions for rail grade crossing coordination and optimization at signalize intersections.	Railroad Companies, County and City Traffic Management Agencies

Agreement	Description	Associated Stakeholder
Multi-Agency ITS Partnership Agreement	A multi-state/multi-agency agreement between stakeholders that jointly support the development of a regional ITS plan will foster a truly integrated regional ITS system. The purpose of the agreement is to support a joint effort of cooperating in the continued development of multi-state, multi-agency ITS using a regional approach to transportation management.	Stakeholders involved in regional ITS plans

11. IMPLEMENTATION AND INTEGRATION STRATEGY

A crucial part of developing an ITS Architecture is establishing an approach to using it. An ITS Architecture provides guidance for planning ITS projects within a region. It also provides information that can be used in the initial stages of project definition and development. This section of the report presents the approach for integrating the ITS Architectures developed for the Iowa Statewide into the transportation planning process and leveraging the ITS Architectures in project definition. In addition, opportunities and considerations for integrating ITS projects and systems at the regional and statewide levels, especially for systems providing traffic management, incident management, and traveler information functions, are discussed.

11.1 Using ITS Architecture in Planning and Project Definition

The Iowa Statewide ITS Architecture represents a detailed plan for the evolution of the ITS systems in the State and can be used to support transportation planning efforts and ITS project development efforts at state and regional levels.

Support Transportation Planning Process

Once an ITS architecture has been created, it's important that it be used as a key reference in the transportation planning process. This will ensure all proposed ITS projects are consistent with the ITS architecture and additional integration opportunities are considered, leading to more efficient implementations.

Long Range Transportation Plan

One of the principal planning documents is the Iowa's State Transportation Plan. Iowa's ongoing planning process, known as Iowa in Motion, provides the direction for planning and developing the transportation system needed to help move our state productively and prosperously into the future. The State Transportation Plan is a long-range guide for major projects, systems, policies and strategies designed to maintain the existing multi-modal surface transportation system in the state and serve the state's future travel needs. The State Transportation Plan must be updated periodically. The Iowa DOT's Office of Systems Planning is responsible for developing and maintaining the State Transportation Plan. Updating the plan for 2025 is currently underway.

The Iowa Statewide ITS Architecture can serve as a key input to the State Transportation Plan. The ITS services and projects identified in the statewide ITS architecture can support the development of long-range and short-range strategies/actions during the state transportation planning that lead to an integrated, efficient inter-modal transportation system. The descriptions of the key goals and attributes of the systems and services included in the statewide ITS architecture can support measurement assessment during the state transportation planning. The Project Sequencing from the statewide ITS architecture can assist the development of prioritized projects and address the consistency of proposed transportation investments in the financial plan, which is typically a part of the Statewide Transportation Plan. In addition, the statewide ITS architecture provides a framework for analyzing how ITS elements are related and thereby to identify the areas for potential coordination and cooperation among agencies. This can promote both systems and inter-jurisdictional integration during the transportation planning.

Transportation Improvement Program

Statewide Transportation Improvement Program (STIP) is another primary transposition planning output that can be supported by the statewide ITS architecture. Iowa's STIP is developed through a cooperative effort with nine MPOs and 18 RPAs. The STIP is developed by incorporating into a single document the portions of the annual transportation improvement programs (TIPs) being funded by the FHWA and FTA within Iowa. The STIP is a three-year listing of projects within the state proposed for federal-aid funding under Title 23 (Federal Highway Funding) and Title 49 (Federal Transit Assistance) of the United States Code. STIP is prepared annually and the projects in the STIP should be consistent with the State Transportation Plan and the LRTPs prepared by the MPOs and RPAs.

As part of the STIP preparation, a project prioritization and selection process is conducted, where the statewide ITS architecture and relevant regional ITS architecture(s) can play a key role. The Project Sequencing output from these ITS architectures can be a major input to prioritization. Integration opportunities identified in the statewide ITS architecture can be used to better define the full benefits of ITS projects. In addition, some of the project description information might be available from the outputs of the statewide ITS architecture, specially the Project Sequencing output.

In addition to the State Transportation Plan and STIP planning, the statewide ITS architecture can be considered to support other transportation planning activities or services associated with ITS projects or projects with ITS elements in the state.

Support ITS Project Development

The statewide ITS architecture should be considered for support in ITS project development cycle. A typical ITS project development cycle begins with project definition, followed by Request For Proposal (RFP) generation, leading to project implementation. Information in the statewide ITS architecture can assist in all three of these areas of project development.

Project Definition

Project Definition may occur at several levels of detail. Early in the planning process a project may be defined only in terms of the transportation services it will provide, or by the major system pieces it contains. At some point prior to the beginning of implementation the details of the project must be developed. This could include further system definition and interface definition including exactly what systems or parts of systems will make up the project, what interconnections the project entails, and what information needs to flow across the system interconnections. Requirement definition may go through similar levels of detail, starting with very high-level description of project functions and moving toward system specifications. By identifying the portions of the statewide ITS architecture that define the project, the architecture outputs can be used to create key aspects of the project definition.

The areas that an ITS architecture can assist in project definition are:

- The identification of agency roles and responsibilities (including any inter-agency cooperation) can come from the operational concept developed as part of the ITS

architecture. This operational concept can either serve as a starting point for a more detailed definition, or possibly provide all the needed information.

- Requirements definition can be completely or partly defined by using the ITS architecture functional requirements applicable to the project.
- The ITS architecture includes a map to ITS standards, and the project mapping to the statewide ITS architecture can extract the applicable ITS standards for the project.

RFP Generation

Once a project is defined, and funding for it is committed, the implementation process can commence with the generation of a RFP, which is the common governmental practice for initiating a contract with the private sector to implement the project. Once a contract is in place, project implementation begins and moves through design, development, integration, and testing.

The statewide ITS architecture, and the products produced during its development, can support this RFP generation. First the project definition described above forms the basis for what is being procured. Mapping the project to the statewide ITS architecture allows bidders to have a clear understanding of the scope of the project and of the interfaces that need to be developed. The functional requirements created as part of the statewide ITS architecture can be used to describe the functional requirements for the project. In addition a subset of the ITS Standards identified as part of the statewide ITS architecture development can be specified in the RFP.

Project Implementation

Because ITS projects involve systems and their interconnections, it is very important to follow a systems engineering approach to designing and implementing the project. While the exact process followed is at the discretion of the local agency, the FHWA and FTA ITS Architecture and Standards Final Rule/Policy lay out a set of required systems engineering analyses for ITS projects funded through the highway trust fund. The required systems engineering analysis steps are:

- Identification of portions of the ITS architecture being implemented;
- Identification of participating agencies' roles and responsibilities;
- Requirements definitions;
- Analysis of alternative system configurations and technology options to meet requirements;
- Procurement options;
- Identification of applicable ITS standards and testing procedures; and
- Procedures and resources necessary for operations and management of the system.

The ITS architecture can provide inputs to a number of these steps as shown in Table 11-1.

Table 11-1. Systems Engineering Requirements Supported by ITS Architecture

Systems Engineering Requirements	ITS Architecture Output
Identification of portions of the ITS architecture being implemented	Mapping the project to the elements and interfaces of the ITS architecture.
Identification of participating agencies' roles and responsibilities	Using Operational Concept as a starting point.
Requirements definitions	Using Functional Requirements as a starting point.
Identification of applicable ITS standards and testing procedures	Using architecture standards outputs as a starting point for the standards definition.

11.2 Integration Strategy

The overall objective of an ITS Architecture is to support the effective and efficient deployment of transportation and ITS projects that address the transportation problems and needs of the region. The ITS Architecture focuses on the integration of systems to gain the maximum benefit of each system's information and capabilities across the transportation network. The integration strategy provides the process connection between the themes and needs identified in the Integrated ITS and Services Deployment Plan and the ITS projects that are deployed within the regions and throughout Iowa at the statewide level. The ITS Architecture defines "what" needs to be put in place to address the needs and requirements of the region. The transportation planning process will leverage the ITS Architecture as a roadmap to project sequencing and interdependency to achieve an integrated transportation system that addresses those strategic objectives.

The most challenging issue in the integration of the ITS Architecture in the planning process is the fact that there is more than one planning process. Coordination is important between the Iowa DOT, the nine MPOs, and the eighteen RPAs for ITS projects in their respective plans. Integration opportunities should be taken advantage of within each of these regions as well as between them. This is the primary intent of the ITS Architecture compliance where Federal funding is involved.

Another difficult issue to address is coordination of ITS project planning between the Federally funded projects and the non-Federally funded projects. Generally, the non-Federally funded projects are not part of the Long Range Planning Process or the Transportation Improvement Program. The ITS Architecture provide a bridge between Federally and non-Federally funded projects and systems. Coordinating all of these projects requires an understanding by all existing and potential ITS stakeholders within the entire region. The ITS Architectures provide a common reference point for all stakeholders to gain insight into the integration of the systems in the region.

A particular topic prompted initial consideration and discussion during the development of the Iowa Statewide ITS Architecture. The Iowa DOT currently practices a decentralized approach to

traffic management and information dissemination in urban areas throughout the state. This decentralized approach allows regional transportation and emergency management agencies to share the control of the DOT owned system and highlights the need for inter-agency coordination, cooperation, and sharing the resources, data and some physical hardware. For example, the Iowa DOT's DMSs in urban areas are typically jointly operated by the DOT maintenance staff and public safety agencies (such as 911 centers) within the area.

A centralized approach, such as a traffic management center (TMC), to statewide traffic management and information dissemination has been considered by the Iowa DOT. Many TMCs are regional facilities and are intended to serve particular areas/regions. However, a TMC can also function as a statewide facility, responsible for providing traffic management, incident management and dissemination of information to the traveling public and the media at a regional and statewide level. It should be noted that this centralized approach does not dictate the need for a large physical building for a traffic management center; rather, it highlights the need and challenges for integrating and sharing the resources, data and some physical hardware. Investigation and evaluation of the pros and cons of the two distinguished approaches to traffic management, incident management, and dissemination of information should be performed. It is recommended that the Iowa DOT should be the lead agency in coordinating with the DOT divisions internally as well as with other organizations such as transportation and public safety agencies in other cities and counties in Iowa to discuss and as appropriate to evaluate the concept, requirements, implications, and subsequently implementation of the options.

12. ARCHITECTURE MAINTENANCE PLAN

12.1 Introduction

The Iowa Statewide ITS Architecture has been created as a consensus view of what ITS systems the stakeholders within Iowa have implemented and what systems they plan to implement in the future. By its nature, the architecture is not a static set of outputs. The architecture should be modified as plans and priorities change, ITS projects are implemented, and the ITS needs and services evolve in the state. There are many actions that may cause a need to update the architecture, including:

- **Changes in Project Definition.** When actually defined, a project may add, subtract or modify elements, interfaces, or information flows of the statewide ITS architecture. Because the architecture is meant to describe not only ITS planned, but also the current ITS implementations, it should be updated to correctly reflect the deployed projects.
- **Changes due to Project Addition/Deletion.** Occasionally a project will be added, deleted or modified during the planning process. When this occurs, the aspects of the statewide ITS architecture associated with the project have to be added, deleted or modified.
- **Changes in Project Status.** As projects are deployed, the status of the architecture elements, services and flows that are part of the projects will have to be changed from planned to existing. Elements, services and flows will be considered to exist when they are substantially complete.
- **Changes in Project Priority.** Due to funding constraints, technological changes or other considerations, a project planned may be delayed or accelerated. Such changes will need to be reflected in the statewide ITS architecture.
- **Changes in Statewide/Regional Needs.** Transportation planning is done to address both statewide and regional transportation needs. Over time these needs change and the corresponding aspects of the ITS architecture that addresses these needs may need to be updated.
- **Changes in Participating Stakeholders.** Stakeholder involvement can also change over time. The statewide ITS architecture should be updated to reflect the participating stakeholder roles in the statewide view of ITS elements, interfaces, and information flows.
- **Changes in Other Architectures.** The statewide ITS architectures includes not only elements and interfaces within the State of Iowa or within an MPO's own region, but also interfaces to elements in adjoining regions or states. Changes in the ITS Architecture in adjoining regions or states may necessitate changes in the Iowa Statewide ITS Architectures to maintain consistency. A Regional ITS Architecture may also overlap

with the Statewide ITS Architecture and a change in one architecture may necessitate a change in the other.

- **Changes in National ITS Architecture.** The National ITS Architecture may be expanded and evolved from time to time to include new user services or refine existing services. These changes should be considered as the ITS architecture is updated.

The following sections define the key aspects of the process for the maintenance of the Iowa Statewide ITS Architecture:

- Who is responsible for architecture maintenance?
- What will be maintained?
- How will it be maintained (i.e. what configuration control process will be used?)?

12.2 Who Is Responsible for Architecture Maintenance

Responsibility for maintaining the Statewide ITS Architecture will lie with the Iowa DOT. While it is recommended that the Iowa DOT assumes responsibility for maintenance, it is further recommended that a group of core stakeholders act as an “institutional framework” to review proposed changes to the architecture. That is, a Statewide ITS Architecture Maintenance Committee should be established to review proposed changes to the Statewide ITS Architecture.

The Architecture Maintenance Committee consists of stakeholders in the Statewide ITS Architecture responsible for reviewing proposed changes. An opportunity should be given to the Architecture Maintenance Committee to review all proposed changes before any changes are accepted and the architecture is updated. It is proposed that the Architecture Maintenance Committee meet on an annual basis, or more frequently as necessary, to review any proposed changes to the architecture.

The Architecture Maintenance Committee should at a minimum consist of representatives from the Iowa DOT and District, Iowa State Patrol, MPOs and RPAs. Any agency or organization identified as a stakeholder in the statewide ITS architecture may participate in the Architecture Maintenance Committee. However, only those members identified above have voting privileges.

The Chair of the Committee should serve as the Maintenance Manager responsible for overseeing and guiding the maintenance effort. It is recommended that the Iowa DOT, as the agency leading the Statewide ITS Architecture effort, assign a person to be the Maintenance Manager. The Maintenance Manager should coordinate the activities of the architecture maintenance, including calling the meetings, making arrangements, assembling an agenda, leading the meetings, and approving minutes.

12.3 What Will Be Maintained

There are several different components that make up the Iowa Statewide ITS Architecture. Some will require more frequent updates than others, but the entire architecture will need periodic review to ensure that it is consistent with statewide and regional goals. The initial

version of the Iowa Statewide ITS Architecture should be established as the baseline architecture, and the maintenance timeframe identified in this document will become effective upon completion of the architecture.

The Iowa Statewide ITS Architecture was developed using Turbo Architecture Software Version 3.1 and stored in an electronic Turbo Architecture database. The architecture is represented through a set of outputs including various reports and diagrams. Collectively these outputs can be used to develop a general ITS architecture document. The architecture will be maintained through updates in the electronic database using Turbo Architecture.

The following will be reviewed and updated at regular intervals:

- Description of the region
- Participating agencies and other stakeholders, including key contact information
- Inventory of existing and planned ITS systems in the region
- Operational concept that identifies the roles and responsibilities of participating agencies and stakeholders in the operation and implementation of the systems
- Agreements required for operations, including at a minimum those affecting ITS project interoperability, utilization of ITS related standards, and the operation of the systems
- System functional requirements
- Interface requirements and information exchanges with planned and existing systems and subsystems
- Applicable ITS standards supporting regional and national interoperability
- Sequence of projects required for implementation

Outputs such as interconnect and architecture flow diagrams, inventory lists, stakeholders lists and other diagrams and reports can be produced from the Turbo Architecture software, so they are by-products of the architecture database. These outputs can be updated as necessary for meetings or outreach activities.

To aid the architecture version document control, it is recommended that the filename of the database should contain the version number and/or date on which the architecture was updated. Also the version number and date should be included in the Turbo Architecture database.

12.4 Configuration Control

Once the architecture baseline is defined, the process for making changes to this baseline must be established. The configuration control (change management) process specifies how changes are identified, how often changes are made, and how the changes will be reviewed, implemented, and released.

How Changes are identified

Changes to the Iowa Statewide ITS Architecture may be identified in two channels. One is that Iowa DOT proposes changes to the architecture according to the ITS projects or projects with ITS components within the region. Another channel is that any stakeholders identified as a participant in the Statewide ITS Architecture may propose potential changes. If the proposed

change is to add a new stakeholder and the stakeholder's ITS elements and interfaces, the Iowa DOT should submit the change request. All change requests should be sent to the Maintenance Manager.

Stakeholders should use the Change Request Form to propose changes. A Change Request Form is shown on the next page. The changes to the architecture, the reasons for the proposed modifications and the stakeholder contact should be clearly defined in the request. Upon receiving a Change Request Form, the Maintenance Manager will perform an initial assessment of the proposed change for the impact to the Statewide ITS Architecture and/or the affected document. If the proposed change has an impact on other stakeholders, the Maintenance Manager should contact the stakeholders to confirm their agreement with the proposed modification. All affected stakeholders should approve and sign-off the Change Request Form before the Architecture Maintenance Committee considers the proposed change.

How often Changes are made

It is recommended that a comprehensive, formal update of the Iowa Statewide ITS Architecture Baseline be performed in corresponding with the Iowa State Transportation Plan updates. This architecture baseline update should be made within 6 months prior to the update of the State Transportation Plan. This will allow an updated version of the architecture to be used as the basis for the State Transportation Plan updates. This maintenance schedule will also ensure that the architecture continues to accurately represent statewide and regional goals. Minor, informal modifications may be made at the discretion of the Maintenance Manager, given the modifications are approved by the Architecture Maintenance Committee.

Change Review, Implementation, and Release

The general steps in the process of change review, implementation and release are:

1. Stakeholders define and propose changes per the recommendations given above.
2. The Maintenance Manager, as necessary in coordination with the stakeholders affected by the proposed changes, evaluates the changes and determines what impact they may have on the architecture and/or associated documentation.
3. The Architecture Maintenance Committee reviews the proposed changes and offers comments.
4. Upon its review, the Architecture Maintenance Committee makes decisions to accept the change, reject it, or ask for additional information.
5. The Maintenance Manager implements the decisions. If the decision is to accept the change, then the appropriate portions of the architecture baseline are updated (per the schedule discussed above) and an updated architecture baseline is defined.
6. Once the statewide ITS architecture has been modified, the stakeholders should be notified by the Maintenance Manager of architecture updates and informed on how to obtain the latest version of the architecture.

The time required to perform this configuration control process will be a direct function of the number of changes suggested to the architecture, which will be driven by how much the architecture is being used. It is suggested that this process be reviewed periodically and fine-tuned to most appropriately address the level of change that has occurred.

**Iowa Statewide ITS Architecture
Change Request Form**

Originator Name:		Date Submitted:
Originator Agency:		
Originator Telephone:	Originator Fax:	Originator E-Mail:
Agency Authorized Signature:		Signature Date:

Description of Proposed Change:		
Rationale for Proposed Change:		
Impacted Agency:	Authorized Signature:	Signature Date:
Impacted Agency:	Authorized Signature:	Signature Date:
Impacted Agency:	Authorized Signature:	Signature Date:
List of Attachments:		
Baseline Document(s) Impacted:		
<input type="checkbox"/> Turbo Architecture <input type="checkbox"/> Architecture Report <input type="checkbox"/> Other (describe)		

To Be Completed By Maintenance Manager		
Change Request No.:	Date Received:	Date Logged:
Date Initially Discussed:	Disposition: <input type="checkbox"/> Accepted <input type="checkbox"/> Rejected <input type="checkbox"/> More Info	Comments:
Data Discussed:	Disposition: <input type="checkbox"/> Accepted <input type="checkbox"/> Rejected <input type="checkbox"/> More Info	Comments:
Data Discussed:	Disposition: <input type="checkbox"/> Accepted <input type="checkbox"/> Rejected <input type="checkbox"/> More Info	Comments:
Date of Committee Approval (If Applicable):		
Baseline Documents Impacted/Version Implemented:		
<input type="checkbox"/> Turbo Architecture	Date: _____	Version: _____
<input type="checkbox"/> Architecture Report	Date: _____	Version: _____
<input type="checkbox"/> _____	Date: _____	Version: _____

